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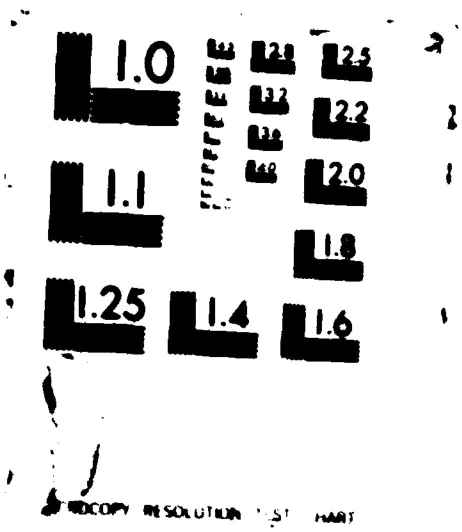
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ABSTRACT

The purpose of the study was to systematically vary both the time available and the structure of information cues for decision problems within a policy-capturing framework. Seventy-eight subjects were randomly assigned to structured or unstructured cue conditions and were asked to make policy decisions under three deadline conditions: unlimited time, a deadline selected by the subject within specified limits, and a deadline imposed by the experimenter.

The results showed that decision makers' policies became simpler in terms of the amount of information used when exposed to deadlines. Contrary to expectations, information usage did not improve under self-selected deadline conditions, although subjects preferred self-selected time limits to experimenter-imposed deadlines. Providing structure to information cues caused observable decreases in the linear consistency of subjects' policies. Structure also resulted in lower self-insight about the actual usage of the provided information.

Two individual difference variables, Type A coronary-prone behavior profiles and cognitive complexity, were measured via the Jenkins Activity Schedule and an experimental Complexity

Self-description Questionnaire. Scores on these instruments were related to policy parameters within the different experimental manipulations. The Type A behavior scores of subjects were found to be significantly related to policy parameters, but cognitive complexity scores were generally not found to be related to task performance. Type A decision makers were found to exhibit greater self-insight than Type B's regarding their actual use of information when performing under deadlines. However, Type B's were found to be more consistent in using the provided information within all time conditions.

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The Pennsylvania State University

The Graduate School

Department of Psychology

Capturing the Policies of Time-Constrained Decision Makers: The Effects of Deadline Control, Cue Structure and Individual Difference Variables

A Thesis in

Psychology

by

Philip Augustus Irish III

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

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manipulations. The Type A behavior scores of subjects were found to be significantly related to policy parameters, but cognitive complexity scores were generally not found to be related to task performance.

It was concluded that task deadlines and cue structure need to be carefully designed when conducting policy-capturing research in order to control for their influences upon the derived policies. The format of the decision problem is especially important because the structure of information cues was found to exert influences on policy parameters which appeared to be outside the decision makers' realm of awareness. Also regarding decision self-awareness, Type A decision makers were found to exhibit greater self-insight regarding their actual use of information when performing under deadline conditions than Type B's. However, Type B individuals were found to be more consistent than Type A's in their use of information within all time conditions.

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Chapter 1

INTRODUCTION

Statement of the Problem

Every human decision task necessarily involves three interacting components: the decision maker, the environment and the decision task (Einhorn 1970). Changing the characteristics of any of these components, either singly or in combination, will exert significant influences on both the process and the products of decision making.

While considerable research has been accumulated over the years regarding each of these decision making domains separately, very little work has attempted to vary characteristics of each of the domains simultaneously, in an effort to explore potential interactions among the influences. The research described herein attempts this purpose. Selected characteristics of interest from each of the three domains, the decision maker, the task and the task environment, will be systematically manipulated to attempt to explore, in relative terms, how individuals' decision-making behavior responds to these modifications.

The Decision Maker

It is widely accepted that human beings as decision

makers are limited in their ability to process information. Innate limitations in focal attention and short term memory are believed to act as constraints resulting in sub-optimal use of information (assuming an optimal strategy exists) in most, if not all, decision applications. Further, the decision maker is often not aware of these limitations in information processing abilities and consequently makes errors in estimating his need for and use of information in decision making tasks. Decision makers always seem to desire more information than is available, and express greater satisfaction when they are presented more information. When asked, they tend to characterize their decision strategies as complex and multidimensional in spite of substantial empirical evidence to the contrary (Slovic and Lichtenstein 1971). This frequently encountered mischaracterization of the process is believed to represent a fundamental lack of decision making self-insight. Even under the best of circumstances, a human being's ability to make informed decisions is limited. These limitations become more important as conditions change with respect to the complexity of the task.

In addition, individual differences are recognized to be significant in determining the information processing capabilities of decision makers. Each decision maker brings stylistic cognitive differences to the decision task which predispose him to process information in

uniquely individual ways. For instance, the cognitive ability to differentiate and assemble information originating from multiple sources is believed to impact the construction of one's decision strategies (Streufert and Swezey 1986). Likewise, each individual's style of coping with controllable and uncontrollable environmental contingencies is believed to constrain the range of information processing strategies which may be used (Krantz, Glass and Snyder 1974, Strube, Lott, Heilizer and Gregg 1986). These cognitive dispositions, among others, serve as built-in guides for structuring adaptive decision responses to changing environmental conditions.

The Decision Environment

The stimulus environment also impacts decision processes by providing a contextual "ground" for the decision task "figure." Subtle changes in task environments have been shown to possess the capability for significant variances in the performance of decision makers (Payne 1982). Changing uncertainty and risk are two basic elements in the environment which have been demonstrated in past research to have major impacts on the process and products of decision makers (Beach and Mitchell 1978, Christensen-Szalanski 1978, Olshavsky 1979). Increasing the uncertainty in the occurrence or the meaning of input stimuli or making more difficult the selection of an appropriate response will serve to bias the decision maker towards predominant, individual styles

of responding. Altering the perceived risk, or the subjective cost/ benefit ratio, also will serve to bias decision makers to opt for certain uniquely determined styles of decision making.

One highly salient feature of the task environment influencing decision making performance is the time frame within which the decision maker has to operate (Payne 1982). The scope and importance of this factor for influencing decision making performance is seen regardless of whether the tasks are performed in the laboratory or the "real world." Clearly defined and explicit time limits often serve as a primary feature distinguishing the laboratory from the "real world". While explicit time limits may not be as frequent within the "real world" setting, it is often the case that critically important decisions in the "real world" are characterized by extremely short deadlines. Numerous examples of time-constrained emergency decision making can be found in a variety of occupational settings, for instance within commercial and military aviation, policework, the nuclear power industry and the practice of medicine, to name but a few. Pilots, police officers and surgeons are all frequently faced with making life or death decisions on a moment's notice and with very little time for deliberation.

The Decision Task

Structural characteristics of the decision task also critically influence the performance of the decision maker. The amount, quality and consistency of input information as well as the method by which it is presented, contribute greatly to the manner in which it is subsequently manipulated. For instance, task complexity has been shown to be a major determinant in the selection of decision making strategies (Payne 1982). Either enlarging the information load or increasing its apparent inconsistency will dramatically change the decision maker's processing of those attributes.

The Method of Investigating the Decision Process

One analytic technique successfully employed by decision researchers for experimentally investigating how individuals utilize information is the "policy-capturing" methodology (see Wiggins 1973 for a careful treatment of the general approach and research in this area). Policy capturing is an "empirical analysis of actual decisions and provides a mathematical description of a decision maker's policy that can be used to predict and understand future decisions" (Taylor and Wilsted 1974, p. 441). This empirically-based approach requires decision makers perform a carefully constructed series of decisions with the ultimate research goal of constructing a model representing the judgement policy of each individual.

This approach is useful for modeling the stylistic manner in which presented information cues contribute to an individual's decision. This model can subsequently be compared to the judge's own subjective opinions about how he believes the information was used and this comparison may be useful for identifying discrepancies between the two models designed to measure the same process.

The general area of concern to be examined in this research is the quantification of the relative contribution to policy variance of selected characteristics of the three major components of decision making as outlined above. To accomplish this end the following broad research questions are posed: To what extent do selected individual difference attributes, temporal deadline conditions and task characteristics interact to influence policy outcomes and further, can these effects be "captured" and compared utilizing traditional policy-capturing linear representations of the decision-making process? Specific research hypotheses are presented later, the above simply serve as overall, guiding considerations for the study.

Importance of the Problem

The issues to be examined in this research are fundamental to an integrated understanding of decision-making processes and possess the potential for helping to create significant improvements in a variety of

decision-making activities. This includes providing a methodology for improving the construction of decision tasks, creating better decision environments and decision-aiding mechanisms, and assisting in the selection and training of decision makers. The process of examining and documenting the policy changes which different decision makers employ when faced with changing environmental and structural contexts will help to ensure that future decisions are based on as much information as is available to the decision maker.

Ultimately, "capturing" these policy changes and using them for instructional feedback may help individual decision makers become more aware of previously unknown biases, influences and limitations which are operating within particular task and environmental circumstances. Bringing these "hidden" influences out into conscious awareness may assist the decision maker to develop insight into his manner(s) of adapting to shifting environmental demands and thereby lessen the impact of those influences. As an example, clarifying hidden influences for some decision makers may be helpful in removing the phenomenological "hurry" associated with time pressured decisions, particularly those who are naturally predisposed towards experiencing that stress. Showing how information salience changes in alternately structured decision tasks is another arena where decision makers may be aided. The process of capturing policies within

changing environmental contexts may provide diagnostic information regarding potential individualized training for improving decision-making performance in specific contexts, such as reduced time for making decisions.

Specific Issues to Be Examined

The first specific goal to be addressed in this research is to document the impact that restricted decision times have on both the subjective and empirically derived policies of decision makers. Further, it will be ascertained whether giving decision makers partial control over the establishment of the deadlines within which they must operate modifies the strategy shifts that seem to occur when people must make speeded decisions.

Second, two fundamental characteristics of decision tasks, the order of presentation of the information cues and the general consistency or agreement of those cues, will be varied. These factors will be examined, together with the time limit manipulations, to evaluate their impact on the resultant policies of decision makers.

Third, the relationship between selected behavioral and cognitive predispositions and the individual's decision making policies will be assessed. Coronary prone behavior profiles (Type A/B), frequently believed to be reflective of predominant behavioral activity levels, and cognitive complexity measures will be gathered on individual decision makers and then related to the manner

in which they utilize information under the various task and environmental conditions.

Chapter 2

BACKGROUND

Development of the Independent Variables

Time Constraints and the Use of Information

The first variable to be explored in this research is the effect that the imposition of time limits has upon decision making. While implicit time constraints exist in the performance of virtually every human judgement task, time limits have not been explicitly manipulated in many complex decision-making research efforts. Because there are so few studies, each will be reviewed in considerable detail.

One of the earlier efforts to systematically explore the impact of this variable discovered that time pressured decision makers tend to focus on negative or undesireable information components of the judgement task (Wright 1974). In this often cited study, subjects were randomly assigned to one of three temporal conditions: a high, low or undefined time pressure manipulation. Subjects were asked to perform a series of 30 purchasing decisions for hypothetical cars, described on the basis of five attributes. Subjects were required to make the judgement using a 4-point scale indicating an estimated probability

that they would purchase an automobile possessing a combination of those characteristics. The high time pressure condition was established through experimenter instructions for subjects to proceed as rapidly as possible without sacrificing accuracy. The low time pressure manipulation was achieved through the instructions that each subject should use an entire 40 second block of time before recording his judgement. The undefined time pressure condition was established by not informing the subjects about any deliberation period requirements.

Postexperimental manipulation checks indicated that the subjects in the high time pressure condition indeed responded faster, and felt more pressure than their counterparts in the other time pressure conditions. Additionally, the decision strategies of approximately two thirds of the subjects within the high time pressure condition were best modeled by a judgement policy which more heavily weighted negative information. Unbiased and positive information biased judgement models did not provide as good fits to the data. Furthermore, the number of information attributes which possessed statistically significant regression coefficients (beta weights) in the subjects' policies was smaller the greater the time pressure condition ($F=4.45$, $p<.05$). This particular result was interpreted to indicate that time-pressured decision makers characteristically attend to fewer

information cues than when not so pressured.

In a similar study (Wright and Weitz 1977) female subjects were asked to evaluate 48 profiles of hypothetical birth control devices. These devices were described using three information dimensions and subjects were given either a quick (10 second) or slow (40 second) decision time constraint. Judgements were scored via an 11 point probability scale (.00, .10, .20, ... .90, 1.00) and indicated the probability they would purchase such a device. The primary analysis was conducted utilizing an ANOVA model where information interaction effects (an index of judgement configurality) could be established.

Results indicated that there was little evidence for the subjects' configural use of the information (interaction effects accounted for only 1% of decision variance) under either temporal condition; and that the importance of the information dimensions varied as a function of the time pressure treatments. Under high time pressure, subjects tended to expand their decision rejection region for profiles with undesireable information and ignore fine distinctions between undesireable information dimensions. In summary, it appeared that time pressured decision makers tended to become cognitively simpler (less sensitive, more unidimensional) in their information evaluation strategies. Postdecision self-evaluations were also collected, and these self-reports suggested that the

subjects were only marginally aware of their shifting relative utilities.

Time pressure research was expanded into the realm of risky decision making with the exploration of decision maker's judgements in choosing between gambles (Ben Zur and Breznitz 1981). In this study 36 subjects were presented with three time pressure treatments, high (8 seconds), medium (16 seconds) and low (32 seconds), in which they were to choose among two gambles characterized by four information cues: amount to win, probability of winning, amount to lose, and probability of losing.

Subjects tended to choose less risky alternatives when under high time pressures ($F=6.44$, $p<.005$). The salience of the cue, amount to win, declined and the salience of the cue, probability for losing, increased during the higher time pressure conditions. This shift in decision making strategy was not interpreted as an increase in random judgement because the subjects' preferences for information cues remained highly consistent within the time pressure conditions. Further, postexperimental data showed that 90% of the subjects believed that they considered all of the information under the low time pressure condition. Under the high pressure condition 75% claimed to consider only two dimensions.

In addition to the decision outcome measures, behavioral activity measures were also collected in this

study. These included latency in beginning the decision task and the average duration spent in viewing the four information dimensions. Analysis of these data suggested that activity levels increased under the two time pressure manipulations and that shorter task initiation latencies and shorter average viewing durations accompanied the higher time pressure condition.

Another study assessing the impact of time constraints focused on the task of estimating the probability that a particular combination of five attributes came from one of two category populations (Wallsten and Barton 1982). In this study 36 subjects were assigned to one of two time pressure treatments: a high time pressure (9 second), or a low time pressure (20 second) condition. The subject's task was to determine whether a combination of five information cues more likely came from population A or B and then provide an estimate of his confidence in his judgement (ranging from 50% to 100%). Each information dimension was portrayed abstractly as a combination of a number and a line of varying length. All problems were displayed with the most important dimension (determined a priori) first and the least important dimension last. The analysis focused on whether the salience of the information dimensions changed as a function of time pressure and whether subjects would base their decisions only on the more important dimensions.

Results indicated that those subjects who had low time pressure (20 seconds to evaluate the display) tended to use all five of the dimensions relatively equally in their decisions. However, those subjects who had high time pressure (only 9 seconds) primarily tended to use the earlier (more important) dimensions with later dimensions contributing less. Furthermore, the reported decision confidence was found not to differ as a function of time pressure. However, confidence estimates did rise when the number of dimensions consistently favoring one choice over the other increased.

A recent study explored the impact of a training intervention upon the choices made when under three decision deadlines (Zakay and Wooler 1984). In this study 60 subjects were assigned to one of three decision deadline conditions: 120 seconds, 30 seconds and 15 seconds. Each subject performed a decision task wherein he chose one of five purchase alternatives, each alternative being described on the basis of five information dimensions. These dimensions were numerical scores ranging from 55 to 100. After completing this task, each subject was then provided instruction in a Multi-attribute Utility (MAU) model regarding how to aggregate information dimensions in an efficient manner. After the training, the subjects were required to make a similar choice decision as they did initially. The pre- and posttraining decisions were evaluated in terms of the

degree of divergence from "optimality", established a priori by the subjects expressed importance for the information dimensions.

Results indicated that subjects under high time pressure consistently chose less "optimal" alternatives than those allowed longer decision times. MAU training in aggregating the information was shown to assist the decision makers only in the unlimited time pressure condition. Contrary to expectation, training was also found to adversely impact subjects making decisions under the most restrictive time limit.

Utilizing a Brunswikian "lens model" approach to the analysis of decision making, a recent study investigated the amount of "cognitive control" and "cognitive matching" which time-pressured decision makers are able to achieve (Rothstein 1986). "Cognitive matching" in this study pertained to the relationship between the subject's judgements and "ecologically correct" decision outcomes, while "cognitive control" related to the consistency with which multiple decisions were made. Seventy-two subjects were assigned to one of two time pressure treatments: 6 seconds or unlimited time. Each subject was required to complete a sequence of 100 judgements, with each judgement based upon two information characteristics. Each information characteristic had 10 possible values.

Results indicated that the presence of a time limit

exerted an effect both upon the decision makers' "cognitive control" and the relative influence of the two information cues. Time-pressured decision makers exerted less "cognitive control" and showed a greater disparity in the importance of the two cues than did non-pressured decision makers. The "cognitive matching" criterion, however, was shown not to be impacted by the deadline condition.

Analysis of Reviewed Research

Collectively, these studies have provided baseline information pertaining to the manner in which decision makers evaluate and integrate information under time pressure. While a number of consistent findings appear to have been substantiated across the studies, there also appear to remain a number of inconsistent areas as well as unaddressed research issues. These will be discussed below.

Cognitive Simplification

An often reported finding for time pressure decision-making research is that decision makers become cognitively more simple in their use of information. It has been reported that the number of information dimensions actually utilized in reaching judgements under time pressure reduces from the three or four cues frequently found in unpressured situations, to one or two cues when time constrained (Benzur and Breznitz 1981,

Slovic and Lichtenstein 1971, Wright 1974, Wright and Weitz 1977). In the Rothstein study (1986), this narrowing even took place from two cues to one cue. This simplification was not thought to be an increase in random activity, but rather a consistent bias in the evaluation of the presented information.

Changing Importance of Information

In the research cited above, another consistent finding appears to be that the salience of positive and negative information changes as a function of introducing severe time limits on the processing of information. In the Wright and Weitz (1977), and Benzur and Breznitz (1981) studies it was shown that time-pressured decision makers come to increase their emphasis on negative (or undesireable outcome) information attributes, for instance, the probability of loss in risky gambles. This apparently was confirmed behaviorally when it was shown that more time was spent viewing negative information dimensions when subjects were time pressured.

Benzur and Breznitz (1981) attributed this shift in processing strategy to a "filtration mechanism" hypothesized to be energized by the introduction of time pressure and to function by screening out less important information. The screening process is thought to be characterized by a narrowing of attention and a focusing on stimulus dimensions perceived to be more central to the

task at hand. At the same time, time-pressured decision makers are believed to become less sensitive to peripheral items. While this perceptual explanation may help to describe the change in information salience within deadline conditions, it also seems to assume that the process is largely automatic, beyond volitional control and therefore outside self-awareness. This is an empirical question and it remains to be seen whether decision makers are aware of and can report on this change in processing. The question which needs to be addressed is, if the salience of information changes when under time pressure (as a function of this screening process), are decision makers aware of that salience change and can they report the change if given an opportunity?

The Impact of Deadline Control

Each of the studies described earlier investigated deadlines from the standpoint that they represented task constraints over which the decision maker had no control. Deadlines are, however, often constructed after having the decision maker's inputs. Do these latter circumstances, where the individual is allowed some influence, represent a different class of time pressured events? Does decision performance qualitatively or quantitatively change? These are two important, and as of yet, unanswered questions.

Information Ordering Effects

The order in which the cue information was presented

was largely ignored in the time pressure literature reviewed earlier. If one assumes that the verbal information contained within most of these experimental decision tasks is acquired and processed serially, by virtue of having to be read, then it may be possible that the cognitive refocusing which appears to be generated by time pressure may also increase the impact of the "serial position effect" (Murdock 1962) within the cue set. A shortening of the total processing time might also reduce the exposure time for each item in a collection, and consequently a structural artifact like the serial position effect may become more important in determining an item's ultimate salience. The impact of this effect may be beneficial or detrimental to the decision maker. On the one hand there may be inherent value for the time-constrained decision maker in anchoring upon the first and/or last piece of information: The process may help to reduce a burgeoning cognitive strain (Russo, Krieser and Miyashita 1975). On the other hand, it may also serve to cause the decision maker to ignore potentially important cues. Earlier studies in impression formation (Anderson 1965, Anderson 1968) have documented that the order of presentation of descriptive adjectives can provide the basis for both primacy and recency effects in influencing social judgements.

Wallsten and Barton (1982) have provided the only clear evidence to date that the sequence of information

displayed to time-pressured decision makers impacts their ultimate judgements. In that study the perceived salience of an information cue was found to vary as a function not only of its position in the list but also by the pattern which preceded or followed it. Of course, this finding contradicts the earlier results of Wright and Weitz (1977) because it indicates the presence of configurality, or the interaction of information items, in judgement.

This area of contradiction also needs to be addressed to ascertain whether or not the interaction of information items may be confirmed. Further, if it can be documented, does this interaction tend to grow or disappear when the decision maker is placed under various time pressure conditions? Utilizing a factorial analysis of variance (ANOVA) approach to the construction and analysis of the information cue combinations allows the estimation of these and other interaction effects.

Individual Difference Variables

In spite of Einhorn's (1970) and other's observations about the importance of decision makers' unique contributions to the decision-making process, none of the time-pressured research cited above has addressed the contribution of individual difference variables. In this regard, two issues seem particularly relevant when discussing decision making capabilities within the context of time limits. These are the person's day to day

characteristic time urgency and the total information load with which he is able to deal. One typology which estimates the normal time urgency that an individual feels is the coronary prone (Type A/B) behavior profile distintion. Another typology addressing the relative information processing capacity that a decision maker possesses is cognitive complexity. Each of these concepts shall be discussed in greater detail.

Coronary Prone Behavior Profiles

In the late 1950s, it was reported that the incidence of coronary heart disease (CHD) in America covaried with a number of specific, identifiable behavioral tendencies (Friedman and Rosenman 1959). These tendencies were aggregated into a behavior pattern which included such behavioral features as: a chronic sense of time urgency, an inability to slow down, competitive achievement striving and increased anger and hostility responses to environmental challenges. Type A behavior profile (TABP) has since been related to a variety of normal daily behaviors, ranging from the pace of walking, talking and eating to appointment arrival times.

<u>The Measurement of Type A Behavior.</u> Since the inception of the profile, TABP has been measured in two principal ways. Initially, profile classification required an extensive structured interview (SI) wherein the examinee's verbal and nonverbal responses (such as

forceful speech, facial tics and grimmacing) were observed and categorized. The SI is designed to be highly stressful and challenging; there are constant interruptions and the questions are often posed in a threatening fashion. Several self-report questionnaire instruments have been developed which purport to accomplish the same classification as the SI. At least three such paper- and pencil-based instruments have been successfully used in research to date: The Thurstone Temperament Schedule (Thurstone 1959), Bortner's Short Rating Form (Bortner 1969), and Jenkins Activity Schedule (Jenkins, Zyzanski and Rosenman 1979). Of these devices, the Jenkins instrument appears to be the most widely employed and therefore best documented in terms of its success in categorizing the TABP. However, it is believed that all of the self-report devices are weaker indicators of TABP than the SI because they do not rely on the direct observations of behaviors.

TABP and Environmental Control. A significant amount of controversy exists regarding the existance of and the explanation for the relationship between TABP and CHD. Potential explanations have been put forward including: greater general hostility, increased cynicism and mistrust, and higher involvement with the self.

More recently, however, it has been hypothesized that an underlying cause for TABP lies within the individual's desire for control over the environment. Also believed to

be crucial are the characteristically different reactions to counter-controlling environmental pressures. This view hypothesizes that Type A individuals acquire the behavior patterns they do, because of their repeated and persistent attempts to instrumentally exert and maintain control. Non-Type A's, or Type B's, on the other hand, are believed to be more willing to allow the external environment a larger degree of counter-control.

If this hypothesis is true, then Type A individuals should differentially respond to controllable and uncontrollable environmental stressors. This has been reported in a number of studies (Blackburn 1984, Boyle 1984, Hollis 1975). For instance, if given an uncontrollable environmental demand, like an immutable deadline, then Type A's should respond more poorly to the lack of individual control than might a Type B. Conversely, if given an opportunity to exert control in the establishment of a deadline, Type A's might be more likely to exploit the opportunity, perhaps responding with less associated stress and a more effective use of the presented information.

Cognitive Complexity

Another individual difference variable potentially of direct concern to time-limited decision-making behavior, is the construct of cognitive complexity. Originally conceived in the 1950s as a social perception variable

(Bieri 1955, Kelly 1955), this concept has evolved into a variable of broader applicability since that time. One recent conception defines cognitive complexity specifically in terms of two basic information processing capabilities: the individual's ability to (1) differentiate and (2) integrate various dimensions of information (Streufert and Swezey 1986). Differentiation is conceived to be the process of dividing cognitive space into two or more independent dimensions. This division is believed necessary for the ordering and processing of information and is integral to the level of information processing effort. Integration is the reverse process of combining two or more information dimensions in order to produce an outcome that concurrently meets the demands of all dimensions. Cognitive complexity essentially deals with the sophistication of these presumed underlying information processing capabilities. These capabilities are conceived to relate to the stylistic manner in which people process information, rather than to the much more variable content of their processing activities. Thus, stylistic differences are conceived to remain relatively stable within particular information domains. Viewing the construct from this perspective,

> Cognitive complexity-simplicity: represents the degree to which a potentially multidimensional cognitive space is differentiated and integrated. A cognitively complex person would employ differentiation and integration as part of his or her information processing. In other words, that person's

> cognitive structure would likely function multidimensionally. A less complex person would respond to stimulus arrays on the basis of few or only one dimension. . . . At the extreme, such a person would function in a unidimensional fashion in response to any or all stimuli. (Streufert and Swezey 1986, p. 18)

Cognitive complexity is currently viewed to deal with four discrete domains: (1) social versus (2) non-social target objects and (3) perceptual information acquisition versus (4) decision making tasks (Streufert and Swezy 1986).

The Measurement of Cognitive Complexity. There are several methods currently available to estimate an individual's cognitive complexity. One commonly used technique is to employ the Role Concept Repertoire or Rep Test (Kelly 1955) which requires the subject evaluate ten persons based upon ten characteristics or attributes. The extent to which apparent conceptual incongruencies occur within this 10 X 10 matrix is interpreted to reveal the level of the person's complexity. This test was originally constructed as a guide for client-therapist interactions, so that therapists could take advantage of matching complexity as an aid in counseling.

Another method available for estimating the level of cognitive complexity uses the Sentence (or Paragraph) Completion Test (Schroeder and Streufert 1962). This subjective test consists of presenting eight sentence stems to which the subject supplies endings. Scores are derived using a seven point rating scale relating the

extent to which the underlying abilities of differentiation and integration are manifested in constructing the sentence endings. When trained appropriately, raters have achieved inter-rater reliabilities of .90 or better. Test-retest reliabilities have been reported between .60 and .95 (Streufert and Swezey 1986). Both the Rep test and the Sentence Completion Test measures of cognitive complexity have been shown to be generally unrelated to measures of intelligence and personality. Unfortunately, however, both of these measurement approaches are difficult and time consuming to administer, require highly skilled administrators and there is little reported agreement between the obtained scores.

The search for an objectively scored analogue to these subjectively evaluated tests has been underway for some time. One experimental self-report instrument under development is titled the "Complexity Self-Description Test" (Driver and Streufert 1969). Factor analysis of test items has purportedly been able to discriminate persons who do not differentiate or integrate from two types of differentiators and from low and high integrators. One version of this instrument consists of ninety-seven items from which seven subscale factors are identified: time urgency, preference for inconsistency, general incongruity level, complexity, differentiation, unidimensionality and acquiescent response set.

An objectively scored assessment of cognitive complexity, like the one described above, offers the promise of a more easily implemented tool with which to try to define both the impact of and the relevant task domains for the complexity construct. Because of the attractiveness of such a measurement alternative, it is desireable to begin to establish the utility of such a self-report device by examining its ability to explain performance differences in a variety of task and environmental conditions.

Cognitive Complexity and Decision Making. Cognitive complexity has been shown in a number of past research efforts to be related to information-processing behavior within problem-solving situations. Shalit (1977) reviewed 75 publications investigating the relationship between cognitive complexity and the nature of problem-solving tasks. His overall conclusion was that an inverse relationship exists between an individual's demonstrated complexity and the information input load. Later, Rotton, Olszewski, Charleton and Soler (1978) similarly showed that stimulus overload tended to reduce one's ability to differentiate social information in group problem solving tasks. As a result of these studies, increasing information load has generally been associated with decreasing the individual's capability to demonstrate cognitive complexity. It is further believed that the decrement due to environmental overload is greater for

cognitively complex individuals than it is for cognitively simple people. Even with this greater impact, it is believed that cognitively complex individuals are still able to cope with greater amounts of information and thus overload than simpler individuals.

Cognitively complex persons have been shown to generally search for more information prior to making a decision than their less complex counterparts, but they also tend to be less certain of their decisions once made (Streufert and Swezy 1986). Cognitively complex people have been claimed to be better able at integrating apparently contradictory information then less-complex individuals. In fact, the need for consistency in information has, by definition, been negatively related to cognitive complexity.

Cognitively simple persons have been shown to be more responsive to the effects of primacy and recency in their use of information (Bieri, Atkins, Briar, Leaman, Miller and Tripoldi 1966). In part this has been attributed to their inability to utilize inconsistent information (Streufert and Swezey 1986). In contrast, cognitively complex individuals are believed more resistant to order effects in information presentation.

<u>Cognitive Complexity and TABP.</u> The relationship between cognitive complexity and TABP has also been explored in some depth. Generally, Type A profiles and

complexity levels have been shown to be uncorrelated, however, on occasion there has been some evidence to suggest that interactions between the variables may be important. Streufert, Streufert, Lewis, Henderson and Shields (1978) investigated changes in physiological arousal (as measured by systolic and diastolic blood pressure and heart rate) for people characterized by Type A/B profiles and cognitive complexity during performance of demanding tasks. They concluded that complexity interacted with Type A/B profiles to establish overall arousal levels. Type A's were found to respond higher to externally induced challenges, while type B's were more responsive when the challenge was self-generated. Type B's with a low cognitive complexity level showed the lowest arousal levels of all groups. Low complexity, Type B's showed little upset when presented with environmental challenge, perhaps reflecting a general predisposition towards an ordered, unchanging world.

Individual Difference Variable Hypotheses

If Type A persons do possess an accelerated internal clock, then this may manifest itself both in their average decision making speed and the length of self-imposed deadlines. Further, if Type As behave as if they are chronically time-constrained, then their policies and their use of information may closely resemble the cognitively simplified and risk averse behaviors of situationally constrained decision makers. Placing these

individuals under even greater time demands may evoke greater behavioral responses than those who appear not to be so time sensitive. An alternative hypothesis, however, is that Type A individuals may show little change from unconstrained to constrained decision making because of their being more familiar with time pressure conditions.

The apparent relationship of cognitive complexity to time-limited decision behavior also provides for the construction of several interesting research questions. First, can the predominant cognitive complexity of individuals be manifested generally within their decision policies? If this complexity can be found within the decision policies, will there be a differential degradation between complex and simple people as a result of externally imposed deadlines? Are more complex people generally slower in their decision-making activities? Finally, is there a differential impact of information ordering upon the judgements of complex and simple individuals?

Development of the Dependent Variables

Judgement Policies

As outlined in the introduction, if given an adequate number of observations, experimenters may model an individual decision maker's policy based on both the expected and actual relationships between the outcome of a judgement task (criterion) and the information

characteristics (predictors) contained within. A multiple linear regression may be constructed which "paramorphically captures" (Hoffman 1960) the extent to which information characteristics are utilized in reaching a particular decision or set of decisions.

Empirically derived judgement policies are calculated from decision makers who make a number of judgements where the component information cues are varied either systematically (through the use of a factorial design) or representatively (through a sampling approach). Two statistical indices of these policies commonly serve as dependent variables within research efforts. First, the statistical regression weights derived for each of the predictors (the b weights or their standardized analogues, the beta weights) have been used to reflect the relative degree of importance within the policy for the predictor information cues. Reliable changes in these weights across a variety of circumstances are interpreted to be illustrative of differential weightings of importance for these cues.

While beta weights are useful for describing the importance of predictors within a given policy, they are less useful for contrasting between several policies owing to the difference in the total amount of variance which is explained by each of the policies. Thus, a refinement to the use of beta weights in this context has been developed to take into account differences in the amount of variance

explained by the model. This extension is called a relative weight (Hoffman 1960). Relative weights are more accurate for comparisons across conditions because they take into account differences in the proportion of variance explained within different situations and because they sum to one. This latter feature allows the weights to be compared to subjective weights (described below) and thus provide an indication of the degree of self-awareness each decision maker possesses.

Second, the square of the overall multiple correlation (R square) associated with each judgement policy (adjusted for shrinkage) reflects the degree of total variance which the model explains and has also been used as a dependent measure. Consistent increases or decreases in the predictability of the model across a variety of circumstances therefore reflects increases or decreases in non-systematic error or random error (as distinct from systematic error or bias) within the response variable(s).

In addition to these objective dependent variables, subjective self-reported decision weights can be gathered through another technique developed by Hoffman (1960). These weights represent the perceived importance of each of the information cues as reported explicitly by the decision maker. As generally employed the technique is to ask each decision maker to divide 100 points among the predictor items, giving more points to those predictors

that are believed to be more important. Because these point values sum to 100, they may be directly compared to the empirically established, relative weights (x100) described above. The comparison of these two weighting schemes thus provides an indication of each policy maker's degree of self-awareness or insight. As with the statistical weights, the subjective weights may also be contrasted across experimentally manipulated situations to investigate their changes. If circumstances arise where relative weights reflect significant changes across conditions not paralleled by the subjective weights, this result may signal increases or decreases in insight on the part of the decision maker.

The policy-capturing approach appears to be particularly well suited for the documentation of the cognitive simplification and changing information salience effects that have been reported for time-limited individuals. The changing relative weights of the information cues should provide direct evidence of these effects. Comparing the relative weights with the subjective weights should also reflect changes or shifts in self-awareness as a function of different experimental manipulations. The policy-capturing approach also appears to be very useful for contrasting between subjects based upon individual difference variables, such as cognitive complexity and coronary prone behavior profiles. At least one area of controversy within the cognitive complexity

research seems amenable to being addressed by this approach--that being the differential rates of information overload for cognitively complex and simple individuals.

Decision Times

Another dependent measure required in experimentation with decision deadlines is the actual decision time utilized. This information is required for two obvious reasons: first, as a manipulation check to ensure that the instructions for speeded responding have indeed been followed. Second, decision times are also useful as a response variable for characterizing potential differences as a function of experimental conditions or between subpopulations such as Type A and Type B behavior profiles and cognitive complexity levels. For example, if Type A's do indeed follow a quickened internal clock, then this accelerated pace may be manifested within the speed that decisions are made. Similarly, a case may be made that cognitively complex individuals, by virtue of their greater information search tendencies, may respond less quickly than their more simple counterparts. Decision times as a response variable should also be sensitive to changes in the construction of the decision tasks, for instance, whether the decision information is ordered or unordered, and also for differences due to the consistency of information contained within the decision profile.

Subjective Perceptions

Measures pertaining to the phenomenological experience of time-pressured decision making are also important. Included within these measures are reflections on the pressure and risk associated with the task and with the confidence the subject has in his perfor...nce.

Confidence

As reviewed above, at least one study in the past (Wallsten and Barton 1982) has shown that despite the imposition of severe deadlines, decision makers maintain a high level of confidence in the accuracy of their judgements. Maintaining a high level of confidence in one's decision-making ability even when environmental circumstances would seem to mitigate, has been likened to the illusion of maintaining control in an uncontrollable situation (Slovic, Fischoff and Lichtenstein 1977). Confidence is apparently shaken only when information cues become perceptibly ambiguous or contradictory, in effect recognized as uncontrollable or unpredictable. In the Wallsten and Barton (1982) study, subjects' confidence decreased only when the proportion of contradictory information increased. If this general overconfidence effect is demonstrated in this research, then confidence should be maintained at a relatively constant level under all deadline conditions and within all information ordering conditions. However, the illusion of control may

be reflected in differences in confidence between Type A and Type B behavior profiles.

Pressure

Another salient measure in deadline research is an estimate of the subjective pressure being experienced during performance of the task. This measure provides an indication of total task involvement that the subject experiences. Withdrawal from the mental demands of the task might be indicated with precipitous drops in expended mental effort and thus reflected in the subjective pressure being felt. This measure should also provide a manipulation check of the effectiveness of the severe deadline conditions. Further, the measure may provide a running check over trials of the degree of fatigue or boredom with the task.

Risk

A third measure believed necessary for inclusion in this research is a subjective estimate of the amount of risk believed to accompany each decision outcome. Risk, as mentioned previously, concerns the anticipated benefit/loss ratio for any particular judgement and should be expected to vary as a function of those parameters. Risk in this context is viewed as being independent of the notion of confidence (in accuracy). If time limits cause decision makers to become risk averse (more sensitive to undesireable or loss related information), then the

perceived risk for time-limited decisions should increase as deadlines become more restrictive.

Summary of Research Hypotheses

Owing to the multifactorial nature of this research, a variety of testable hypotheses may be generated. The following list enumerates these hypotheses.

H1. Decision makers will be less able to accurately express (via subjective weights) their policies when under time pressure then when there is no time limit.

H2. Giving decision makers the opportunity to help establish the deadlines will reduce the pressure felt during the task when compared with performing the task under imposed deadline conditions.

H3. The structure of information cues will become more important under time constraints. This will be reflected in greater performance differences between time-constrained conditions compared with unconstrained conditions.

H4. The values of information cues will not be dependent upon the values of other cues (configural use) in any time condition.

H5. The self-reported perception of risk will increase as a function of increasing time pressure.

H6. Decision times will be longer for:

A. conditions of unstructured information.
B. decisions with less consistent cues.

C. Type B individuals versus Type A.
D. conceptually complex versus simple individuals.

H7. The policies of Type A individuals will:

A. show better use of information under self-selected deadline conditions than experimenter-determined conditions.
B. show less insight across all conditions than Type B individuals.
C. show no differences in subjective weights from Type B individuals.

H8. The policies of cognitively complex individuals will when compared to cognitively less-complex people:

A. show greater overall information usage.
B. show greater degradation in the use of information as a function of deadlines.
C. be less responsive to the effects of information structure conditions.

H9. Self-imposed deadlines will be shorter for:

A. Type A versus Type B individuals.
B. cognitively simple versus cognitively complex individuals.

Uniqueness of the Approach

This research addresses the performance of time-constrained decision makers from a number of unique perspectives. First, no previous work has been directed towards exploring the importance of perceived or imagined control over the establishment of time constraints to the impact of those deadlines. Second, past research has addressed the issue of the subjects' self-awareness of policy shifts from an anecdotal standpoint; it has not been a primary thrust of experimentation. The present

research will explore the extent to which decision makers can explicitly state their policies within three different time constraint circumstances, and thus provide direct information on their awareness of any strategy shifts. Third, most of the previous research on time limits has employed a between-subjects methodology and has not focused on the impact of deadlines within individuals. Thus, it has not been directly demonstrated how an individual's decision making insight changes with the introduction of deadlines. This research focuses on the impact of deadlines within individual's policies. Fourth, also regarding the capabilities of individuals, little work to date has been accomplished which attempts to compare the effects of situational time urgency with the effects of chronic time urgency predispositions that individuals may possess. This research addresses that gap. Fifth, the impact that the presentation structure of information dimensions has, has not been adequately explored. Again, the present research will attempt to come to grips with this issue.

This research also intentionally includes a number of benchmarks designed to confirm earlier findings. For instance, much work has been accomplished on the risk-averse, simplifying cognitive shift which occurs for many time-constrained decision makers. This shift should be clearly identifiable in the present research as well. Also, because the task to be used in this research has

been successfully used in previous efforts, the relative importance of specific information cues should also remain fairly consistent with that of previous findings.

Within the policy-capturing tradition, the ability of subjective weights to reflect changes in the policies of decision makers will be explored to the extent that the responsiveness of these weights to new conditions will be examined. In general, the policy-capturing approach will be extended into exploring the relative effects that task, environmental and individual factors simultaneously exert upon resultant judgements. This experimental approach should provide evidence regarding the robustness and accuracy of policy-capturing models established under one set of environmental or task circumstances, yet used to describe and predict other situations.

Chapter 3

METHODOLOGY

Experimental Task

The experimental judgement task selected for use in this research was an organizational preference task. The task was accomplished by presenting combinations of hypothetical organizational characteristics to subjects and having them provide an overall judgement on each combination. This task was selected because it had been used successfully in previous judgement research (Rothstein 1986, Zedeck 1977) and it represented a judgement task thought to be relatively engaging for the intended subject pool of college students. A judgement task was selected as opposed to a choice decision task (selecting between alternatives) because the thrust of this research was to examine the subject's integration of information when selected characteristics of the decision task were varied. The information cue levels are portrayed in Table 1.

The task was modified for use in this research. The organizational preference task (Zedeck 1977) was shortened from its original six information dimension structure to a four dimension task. The retained dimensions were the four rated most important as reported in the original

Table 1. Information Cue Levels for Experimental Task

Cue number 1, Starting salary:

(1) The starting annual salary is $12,300.
(2) The starting annual salary is $14,700.
(3) The starting annual salary is $20,600.
(4) The starting annual salary is $23,400.

Cue number 2, Job security:

(1) Our company is highly affected by market trends; such trends, and not your job performance, will solely determine your stay with us.
(2) Our company is highly affected by market trends; those trends will have a larger effect than your performance on your stay with the company.
(3) Market trends have only a slight effect on your stay with the company; your job performance counts much more.
(4) Your job performance will affect your stay with the company; however, from our experience, those who are hired stay with us as long as they wish.

Cue number 3, Responsibility in decision making:

(1) Even after a long time with the company, no employee participates in operational decision making or shares responsibilities.
(2) Few of our high tenure employees participate in operational decision making and share responsibilities.
(3) A majority of those who stay with the company for some time participate in operational decision making and share responsibilities.
(4) When first joining us, everyone participates in operational decision making and shares responsibilities.

Cue number 4, Advancement:

(1) No employee has a chance of being promoted within the first two years.
(2) About 25% of the employees have a good chance of being promoted within the first two years.
(3) About 75% of the employees have a good chance of being promoted within the first two years.
(4) Practically everyone has a good chance of being promoted within the first two years.

study. Each dimension was further simplified from five levels to four levels. The levels which were retained included the two most desireable, or positive levels, and the two most negative, or undesireable levels. This simplification was accomplished to reduce the experimental design requirements (rather than 7776 treatment combinations, the full factorial of the simplified task structure consisted of 256 combinations of information levels).

Each subject was ultimately presented with 192 different combinations (or 3/4 of the full factorial), one combination at a time (in blocks of 64), and was required to indicate via a seven point judgement scale, the probability that he would choose each particular example. This judgement scale is presented in Table 2.

Subjects

Seventy-eight subjects were recruited from introductory Psychology classes at the Pennsylvania State University. Each subject received research credit for participating in the study and completing the data requirements. Subjects were also eligible for additional rewards dependent upon the quality of their participation. Subjects who made their decisions within the allotted time limits accumulated points which were exchanged for nominal prizes at the conclusion of the research.

Table 2. The Decision Rating Scale

1 =	0%; definitely would not choose this alternative
2 =	approximately 1-24% probability of choosing
3 =	approximately 25-49% probability of choosing
4 =	approximately equal likelihood of choosing or not choosing (50-50)
5 =	approximately 51-74% probability of choosing
6 =	approximately 75-99% probability of choosing
7 =	100%; definitely would choose

Assignment of Subjects to Groups

All subjects were administered two self-report surveys during the study. One survey was the Jenkins Activity Survey (Jenkins, Zyzanski and Rosenman 1971) as modified for use in college populations (Krantz, Glass and Snyder 1974). The other test was the Complexity Self-Description Test (Driver and Streufert 1969). The following biographical data were also collected: age, gender, major, GPA and class standing.

Each subject was assigned to one of two cue structure groups: either ordered (n=38) or unordered (n=40) based upon when they arrived for the experiment. Subjects received all combinations of information cues in either an ordered or an unordered format dependent on their group assignment. In the ordered treatment the most important cues were presented first, with less important cues presented in descending order. The importance of the cues was derived from the results of previous research. The subjects in those earlier experiments were introductory psychology students and graduate business students. The cues generally found to be most important in that research were assumed to be of similar importance to the present sample of university students. Additionally, within each of the ordered/unordered groups, individuals were also assigned to one of two deadline treatment sequences (cell size = 19 or 20).

Determination of Deadline Conditions

Three time limit conditions were created for this study. They were an unlimited time condition, an uncontrollable deadline established by the experimenter and a partially-controllable deadline selected by the subject within specified constraints. Deadline times were determined on an individualized basis. For the unrestricted decision time condition, response times (D1) were recorded for each subject during a practice session. Response times for the last three practice trials were averaged to establish an individualized baseline. The next time limit condition, the uncontrollable deadline, was created by taking each subject's average unrestricted practice time and dividing it in half (.5 X D1). The third deadline condition, the partially controllable decision deadline, was created by forming a "decision window" where the subject was required to respond (R) within a time band specified by the experimenter. The subject was allowed, however, to select a specific response time anywhere within this time window. The time band was constructed to require responses within $.4 \times D1 < R < .75 \times D1$ so that subjects had to respond in a speeded fashion, as in the controllable condition, but in this case had some control in determining their actual deadline. It should be noted that the uncontrollable deadline time fell within this window.

The passage of time was marked by the sounding of a

1000 HZ aural tone, once per second. Deadlines were signaled by having a 2000 HZ tone sound two seconds prior to the deadline and this higher tone continued sounding twice per second until the response was made. The higher tone signaled the subject to immediately record the judgement decision.

Time Limit Treatment Sequence

The time limit treatments, uncontrollable deadline and partially controllable deadline, were ordered such that one half of the subjects received each of the treatments first following the initial no-deadline block. This counterbalancing was undertaken to control for potential carry-over performance effects from previous time constraint conditions. The experimental design for the two independent variables, Cue Structure and Decision Deadline, is portrayed in Table 3.

Testing Procedures

All subjects were tested individually using a microcomputer to present and collect all decision information. Each subject participated in three sessions approximately four days apart. Experimental sessions took approximately an hour to complete. After assignment to an experimental group, the subject was presented an extensive practice session including an overview of the requirements of the study, its duration and the anticipated outcomes. At this time subjects were informed about the

Table 3. Experimental Design
for Deadline and Cue Structure

	Subgroup	Deadline Sequence		
Group 1: Ordered Structure (n=38)	1 (n=19):	A	B	C
	2 (n=19):	A	C	B
Group 2: Unordered Structure (n=40)	3 (n=20):	A	B	C
	4 (n=20):	A	C	B

n= number of subjects
A= No Deadline Condition
B= Uncontrollable Deadline
C= Partially Controllable Deadline

administration of the reward point system.

In the practice session subjects were presented instructions about accomplishing the decision task. The procedure for the task was explained and the relevant information dimensions were presented to the subject. The subject was presented with the cues for each dimension and he was asked to scale for himself each level on a ten point desireability continuum (0 representing least desirable, 10 representing most desirable).

After the subject had scaled the information cues, he was provided ten trial examples of the task under each deadline condition (for a total of thirty trials). This training period provided an opportunity to practice the task and to establish the baseline decision time. Each trial was accomplished in the following manner: the subject was asked if he was ready to begin,and the decision task was presented to the subject. Aural cues signalled the passage of time and the onset of the deadline. The subject responded by selecting from the rating scale provided on the computer screen. Questions pertaining to the subject's perceived confidence, pressure and risk were presented at the end of each block of trials. The scales for these questions are shown in Table 4.

At the conclusion of the 30 trials, the subject was then asked to assign point values to the information

Table 4. Confidence,Pressure and Risk Ratings

Confidence Rating

Using the following scale, how would you rate your confidence in the accuracy of your judgements so far?

1= Extremely confident (95-100% accuracy)
2= Very much confident (90-94% accuracy)
3= Moderately confident (80-89% accuracy)
4= Mildly confident (50-79% accuracy)
5= Not confident (below 50% accuracy)

Pressure Rating

Using the following scale, how would you rate the pressure that you are experiencing?

1= Extremely pressured
2= Very much pressured
3= Moderately pressured
4= Mildly pressured
5= Not pressured

Risk Rating

To what extent, if any, do you feel that the judgements you are making are risky or conservative?

1= Very conservative
2= Moderately conservative
3= Uncertain
4= Moderately risky
5= Very risky

dimensions based upon how important he felt these cues were to him in making his decisions. This subjective weighting decision is presented in Table 5.

After the practice, the first session began data collection on the unlimited time decision task. This experimental session consisted of a block of 74 decision trials. Within this block of trials the time constraint remained the same. For the first 64 trials the information combinations were presented in random order. The last ten trials consisted of a repeat of the first ten treatment combinations but presented in reverse order. The purpose for presenting these trials again was to provide a test-retest reliability check on the stability of the subjects' judgements. Confidence, pressure and risk questions were presented after the 25th, 50th and 74th trials. The subjective weighting decision was also presented after the 74th trial. Rest periods were provided whenever requested and at the end of each block of testing.

The second and third experimental sessions involved performing the task under the self- and experimenter-limited time conditions. In these sessions the time constraint was first established (either by informing the subject of the target to shoot for or by asking him to select a deadline within the time window presented on the computer screen) and the ramifications of hitting the target time were explained. In these

Table 5. Subjective Weight Decision

We would like you to estimate how important each information cue was to you for your judgements in this session. Assuming that you have 100 points to distribute to the four information dimensions, please assign a number of points to each dimension with more points going to the more important dimensions.

For example:

1. Job Security	40
2. Advancement	10
3. Salary	20
4. Responsibility	30
TOTAL	100

Please enter your rating for Salary: ______ (0-100)
Please enter your rating for Advancement: ______ (0-100)
Please enter your rating for Job Security: ______ (0-100)
Please enter your rating for Responsibility: ______ (0-100)

sessions, the experimental procedure was thereafter identical to the first unlimited time session.

Following completion of all data collection sessions, subjects were debriefed regarding the use of the data and their access to the results of the study. After decision times were evaluated for meeting the deadline requirements, subject's point scores were totalled for rewards. One point was awarded for each trial the subject recorded his judgement within +1 or -1 second of the deadline. The conversion scale for points to dollars was 37:1. The maximum award possible was $4 per subject.

Data Analysis

Policy Analysis

A standard regression equation using the following form was obtained for each individual within each of the three time treatments:

$$Y_d = \sum_{i=1}^{k} b_{id} \; x_i \qquad (1)$$

where: Y_d = Decision maker's rating of the hypothetical organization.
k = 64 trials.
b_{id} = Weight of each information cue.
x_i = Information cue.

Cue weights were expressed as standardized regression coefficients. Relative weights were calculated for each predictor cue from the regression results such that:

$$RW_{id} = \frac{B_{id}\, r_{id}}{R^2} \qquad (2)$$

where: RW_{id} = Relative weight for cue i.
B_{id} = The beta coefficient for the ith predictor.
r_{id} = The correlation with the judgement of the ith predictor.
R^2 = Squared multiple correlation coefficient of the regression equation (1).

The analysis of primary concern consisted of estimating the relative weights for each information dimension across the independent variable conditions and then comparing them to examine strategy changes in the apparent use of the cues. The relative weights for each deadline condition were also correlated with the subjective weights expressed by the subjects to examine the degree of self-insight each policy maker demonstrated. The correlations between subjective and relative weights were contrasted by converting them to Fisher's Z's (Hayes 1973) and testing for significant differences.

The number of significant ($p < .01$) beta weights for each individual's policy within each decision time condition was also compared to estimate the degree of cognitive simplification occurring due to the time pressures. The mean number of significant beta weights across subjects in the two information cue structure conditions were contrasted to examine the impact of the structure variable in the different deadline conditions.

Changes in the relative and subjective weights of the information cues were examined specifically as a function of the interaction of deadlines with structure and different cognitive complexity and Type A/B behavior profile groups.

Test- retest reliability coefficients were computed for the redundant decision trials to assess the reliability of decisions within each of the deadline conditions. The consistency with which the subjects employed their policies for each of the deadlines and information ordering conditions were examined by comparing the policy R squares; larger R squares being indicative of greater consistency in judgement.

Confidence, Pressure and Risk Ratings

The subjective ratings provided information on the subjective experience of the experimental manipulations and thus provided a check on the effectiveness of the inducements. Ratings of experienced time pressure, confidence and perceived risk in judgement were contrasted as a function of time allotted, cue structure, Type A/B behavior classification, and cognitive complexity.

Decision Times

Decision times were analyzed to examine potential differences between Type A/B behavior profiles, cognitive complexity levels, and the information structure of the

decision task. Decision times were also analyzed in terms of the degree of cue consistency in the information profile. Faster decision times were expected to accompany more consistent information. Uncontrollable deadline times were analyzed to ensure the subject's conformance with the experimental restrictions. Controllable deadline times were analyzed to explore whether meaningful between-subject differences could be detected.

Chapter 4

RESULTS

Descriptive Data

Seventy-eight of the 80 subjects who began the experiment provided complete data for the study. The subjects ranged in age from 18 to 39. There were 40 male and 38 female subjects. Twenty-three males were assigned to the unstructured group and 17 were assigned to the structured group. Eighteen females were assigned to the unstructured group and 20 to the structured group. The average time which elapsed between experimental sessions was 4.3 days. The range was from one to eight days.

Individual Difference Variable Data

Subjects were assigned to groups for the Type A/B and the Cognitive Complexity contrasts based upon their individual scores on the modified Jenkins Activity Schedule and the Complexity Self-Description Test. Subjects who scored above the sample mean for the Jenkins test were assigned to the Type A group, and those below to the Type B group. In past research, scores on this test have generally resulted in mean values in the range of 7 to 8. The sample mean for this experiment was 8.34 with a standard deviation of 3.29. The mean score and standard

deviation for those in the Type A group were: 11.13, 1.93. The Type B group's mean and standard deviation were: 5.70, 1.78, respectively.

Subjects were likewise assigned to high and low Cognitive Complexity groups dependent upon their survey scores. Seven factor scores were obtained from this experimental survey, but only the "complexity" factor score was used in this research, as this score was deemed most relevant to the task of integrating information. The scores for the complexity scale ranged in value from 194.75 to -284.25 with a mean of -100.72 and a standard deviation of 96.40. The mean and standard deviation for the high complexity group were: -25.00 and 66.53. These statistics for the low complexity group were: -176.45 and 51.31, respectively.

The observed correlation between scores on the Jenkins Activity Test and the Complexity scale score was: $r = -.030$. Assigning subjects to groups based on mean splits created the following Type A-Cognitive Complexity cell frequencies: Type A and high Complexity, $n=18$; Type A and low Complexity, $n=20$; Type B and high Complexity, $n=20$; Type B and low Complexity, $n=20$.

Benchmark Analyses

Several analyses were conducted on the data to ensure their consistency with previous research and to ensure the validity of the experimental manipulations. First, the

relative weights of the four information cues were calculated to include all subjects and all conditions. The mean and standard deviation for the relative weights of the four cues were as follows: cue # 1 =.58, standard deviation (Sd.) = .30; cue #2 =.25, Sd.=.25; cue # 3 =.08, Sd.=.15; cue #4 =.07, Sd. =.12. This descending pattern was consistent with the results of previous research (Zedeck 1977) and validated the structuring of the cues used in the present research. As in that study, salary was found to be most important overall, followed in descending order by job security, responsibility and advancement.

Second, mean decision times were calculated as a function of the deadline conditions to ensure that subjects did indeed respond faster when they were faced with deadlines. The means and standard deviations for the response times (in seconds) in the unlimited, self-limited and experimenter determined deadline conditions were: Unlimited =6.16, Sd.= 3.26; Self-Limited = 5.47, Sd.= 2.44; and Mean Experimenter Determined =4.85, Sd.= 2.21 respectively. A mixed effects model Analysis of Variance (ANOVA) on all decision times observed within the experiment for the deadline manipulation resulted in an overall F ratio (df=2, 14973) of 809.23, p=.0001, indicating that subjects responded increasingly faster under the self-limited deadline and the experimenter-determined deadline.

Policy Construction Methods

The decision policies for each subject were calculated in two ways: using either the cue level values (ranging from 1 to 4) assigned a priori by the experimenter (based on the rank order of the cue levels in previous research), or alternatively using the cue level values assigned by each individual immediately prior to collection of the decision data. The self-scaled policies consistently were associated with higher R squared values than the experimenter-derived policies. This effect, however, tended to decline with increasingly restrictive deadlines. The difference in R squared values between the two approaches to constructing the policies for the unlimited time condition was significant, $t(77)=2.82$, $p=.006$. The means and standard deviations were: self-scaled =.640, Sd. = .14, experimenter scaled = .615, Sd. = .16. In the self-limited condition, the difference was marginally significant, $t(77)=1.87$, $p=.061$, and within the experimenter-determined deadline condition the difference was not significant. Because of the consistent predictive advantage of the self-scaled policy models, only data generated from this approach will be reported.

Policy Reliabilities

Test-retest reliabilities were calculated for each subject within each deadline condition using the responses from the ten redundant decision trials. Reliabilities

were calculated in order to have an estimate of the degree of decision consistency within the different deadline conditions. The mean test-retest reliability for all subjects within the unlimited time condition was r=.65. The reliabilities for the self-limited and the experimenter-limited time conditions were: .70 and .72 respectively. Maintaining a consistent reliability within the two deadline conditions indicated that policy performance did not deteriorate with the introduction of the various time constraints and that decision making did not become more error-prone under these circumstances.

The Impact of Deadlines

Subjective Ratings

Subjective self-reports of perceived risk, confidence and pressure were collected under all conditions of decision deadlines. Each dimension was sampled 3 times within an experimental session: at the end of the 25th, 50th and 74th trials. For the purpose of analysis these observations were averaged to represent the overall rating for each dimension in each experimental session. Because it was desired that selected contrasts compare specific deadline conditions or specific combinations of deadline conditions, t-tests were used in lieu of the more omnibus F-test for certain comparisons and will be reported. The means and standard deviations for the ratings of risk, confidence and pressure within each of the deadline

Table 6. Subjective Rating Means and Standard Deviations for All Time Conditions

Rating	Time Condition		
	UNLIMITED	SELF-LIMITED	EXPERIMENTER-LIMITED
RISK (1= LOW, 5= HIGH)			
Mean	2.457	2.384	2.525
Sd.	.741	.762	.808
CONFIDENCE (1= HIGH, 5= LOW)			
Mean	2.583*	2.360*	2.480
Sd.	.690	.765	.714
PRESSURE (1= HIGH, 5= LOW)			
Mean	3.791	3.974*	3.692*
Sd.	.724	.722	.730

n for all entries= 78
* significantly different (at $p < .01$) from other row entry with same symbol.

conditions are contained within Table 6.

The ratings for perceived risk approached the limit of statistical significance, t (77)= 1.79, p=.077, for the self-limited versus the experimenter-limited deadline conditions, but it was concluded they did not vary as a function of deadline condition. The ratings for perceived confidence and pressure, on the other hand, did vary.

Self-determined deadline conditions were associated with significantly higher, t (77)= 2.97, p=.004, confidence ratings than for unlimited time conditions. The confidence ratings for self-determined deadline conditions also approached significance, t(77)=1.64, p=.099, in comparison to the experimenter-determined deadline conditions. Self-determined deadline conditions were also associated with significantly lower, t (77)=3.25, p=.002, perceived pressure than for the experimenter determined deadline conditions. In sum, of all the time treatment conditions, the self-selected deadline was associated with somewhat higher confidence and lower pressure ratings.

Policy Changes

Exposure to varying deadline conditions resulted in changes to several indices associated with decision makers' policies. First, the number of statistically significant (p<.01) Beta weights declined as a function of the presentation of either self-determined or experimenter

determined deadlines, t (77)=3.67, p=.0007. The mean number and standard deviation of significant Beta weights for policies constructed under the unlimited time condition were 2.44 and .89, while the mean and standard deviation for the two time limited conditions were 2.09 and .85.

The R squared values of the policies were not found to change as a function of deadlines. The following lists the mean and standard deviation for the R squared values for the three deadline conditions: unlimited = .64, Sd.=.14; self-limited = .65, Sd.=.14; experimenter limited =.63, Sd.=.19.

The extent of the observed interactive (configural) use of information was found to change as a function of deadline condition. Of the six possible, two cue interaction terms which could be estimated by the fractional factorial part of the study, only one interaction term consistently appeared to reach statistical significance. This interaction was between the first and second information cues (salary and job security), and it appeared to decline in size as the deadline conditions became more restrictive. The overall F ratios (df=9, 4982) for this interaction within the unlimited, self-limited and experimenter-limited time conditions were: F (Unlimited) = 13.43, p=.0001; F (Self-limited) = 11.48, p=.0001; and F (Experimenter limited)= 8.76, p=.0001. The omega square values

associated with this effect in these time conditions were: .009, .008 and .006, respectively.

The presentation of deadlines also resulted in significant shifts in the patterns of relative weights for the information cues. The mean relative weights for cues #1, #2 and #3 changed significantly over the three deadline conditions. The relative weight for cue #4, advancement, did not change and is low throughout. The means and standard deviations for the relative weights of all of the cues in each of the deadline conditions are displayed in Table 7.

Subjective weights also changed as a function of deadline conditions. The mean subjective weight for cue #1 changed significantly, $F\ (2,154)=4.42$, $p=.013$, as a consequence of deadline manipulations. The means and standard deviations for this cue's subjective weights within the three deadline conditions were: Mean unlimited (MU)=35.89, Sd..= 10.89; Mean self-limited (MSL)=38.42, Sd..=13.53; Mean experimenter limited (MEL)=38.14, Sd..=14.67. The subjective weights for the remaining three cues were not found to change, although the results for Cue #2, job security, approached statistical significance, $F\ (2,\ 154) = 2.85$, $p = .058$.

The decision-maker's insight (previously defined as the correlation between the statistical relative weight and the self-reported subjective weight for the four

Table 7. Relative Weights for Cues 1 to 4 for All Time Conditions

	Time Condition		
	UNLIMITED	SELF-LIMITED	EXPERIMENTER-LIMITED
CUE 1 (SALARY)			
MEAN	.532*+	.603*	.608+
Sd.	.300	.311	.309
CUE 2 (JOB SECURITY)			
MEAN	.281*	.237*	.256
Sd.	.247	.256	.264
CUE 3 (RESPONSIBILITY)			
MEAN	.102*+	.084*	.068+
Sd.	.173	.155	.125
CUE 4 (PROMOTION)			
MEAN	.082	.073	.072
Sd.	.097	.126	.143

*, + significantly different (at $p < .05$) from other row entries with same symbols.

information cues) was not found to change significantly as a function of deadline conditions. Employing a T-test for related samples, comparison of the correlations showed that the insight demonstrated during the unlimited time condition (r=.44) was not different, t (309)= 1.09, p<.250, from either the self-limited condition (r=.49) or the experimenter-limited time condition (r=.48). In sum, the introduction of deadlines into the task caused decreases in the number of cues used to formulate the policies and did not cause any changes in the consistency with which the policy was applied. Cues were found to be used independently by decision makers and they showed no degradation in their policy insight because of the time constraints.

The Impact of Cue Structure

Decision Times

Using a mixed effects model ANOVA there was no significant main effect for the cue structure variable in the mean response times within any of the deadline conditions. There was, however, a significant, F (2, 14973) = 35.21, p=.0001, structure by deadline interaction. The means and standard deviations for this interaction are portrayed within Figure 1.

Policy Changes

There also appeared to be a significant effect, F

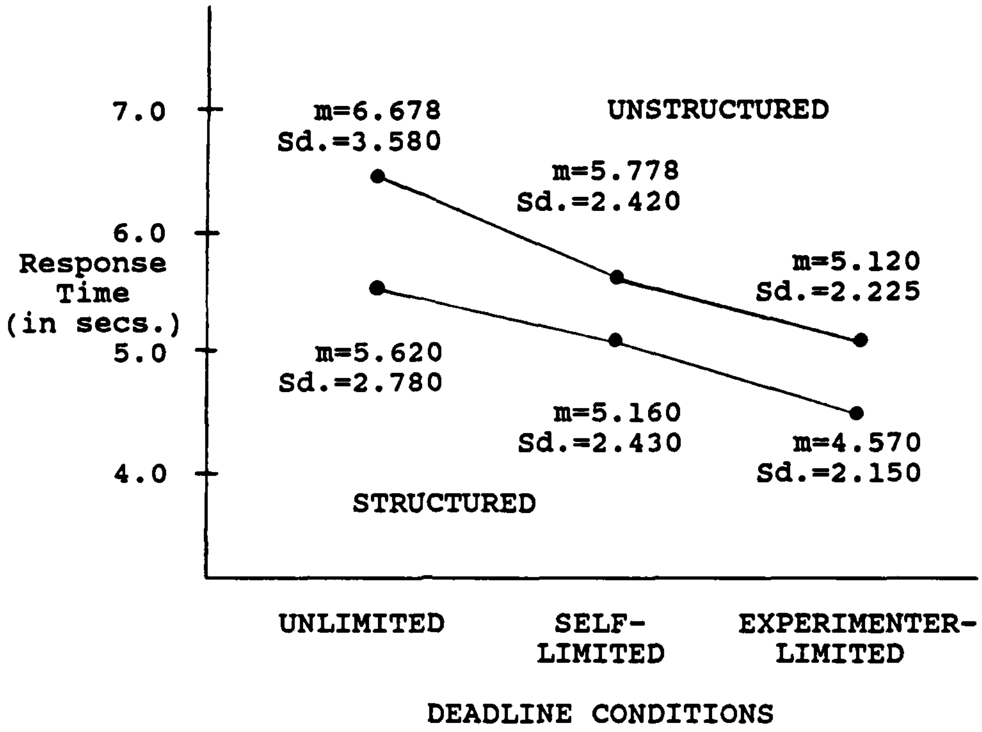


Figure 1. Decision Times for Structure
and Deadline Conditions

(1,76)= 6.82, p=.010, for cue structure upon the resultant R squared values of the policies. The means and standard deviations for the structured and unstructured R squared values are depicted in Figure 2. Unstructured problems tended to result in higher R squared values than did structured problems. Additionally, there appeared to be a marginally significant, F (2,152)= 2.73, p=.066, structure by deadline interaction in these data as well.

Subjective weights were also found to vary as a function of whether the cues were structured or not. The subjective weights for cues #1 and #2 were found to be significantly different, F (1,76)= 7.31, p=.014 and F (1,76)= 8.29, p=.005, respectively, while the weights for cues #3 and #4 were not found to be different. The means and standard deviations for cue #1's subjective weights in the structured and unstructured conditions were as follows: Mean structured = 33.78, Sd. = 10.97; Mean unstructured = 41.00, Sd. = 13.96. For cue #2 the means and standard deviations were: structured = 22.18, Sd. = 7.83; unstructured = 17.61, Sd. = 8.24.

A significant main effect for the structure variable was found in the relative weights of two of the information cues. Cues #1 and #4 were found to vary significantly as a function of problem structure. The relative weight for cue #1 was significantly higher, F (1,152)= 4.87, p=.028, when it was presented within an unstructured problem format, then when it was presented

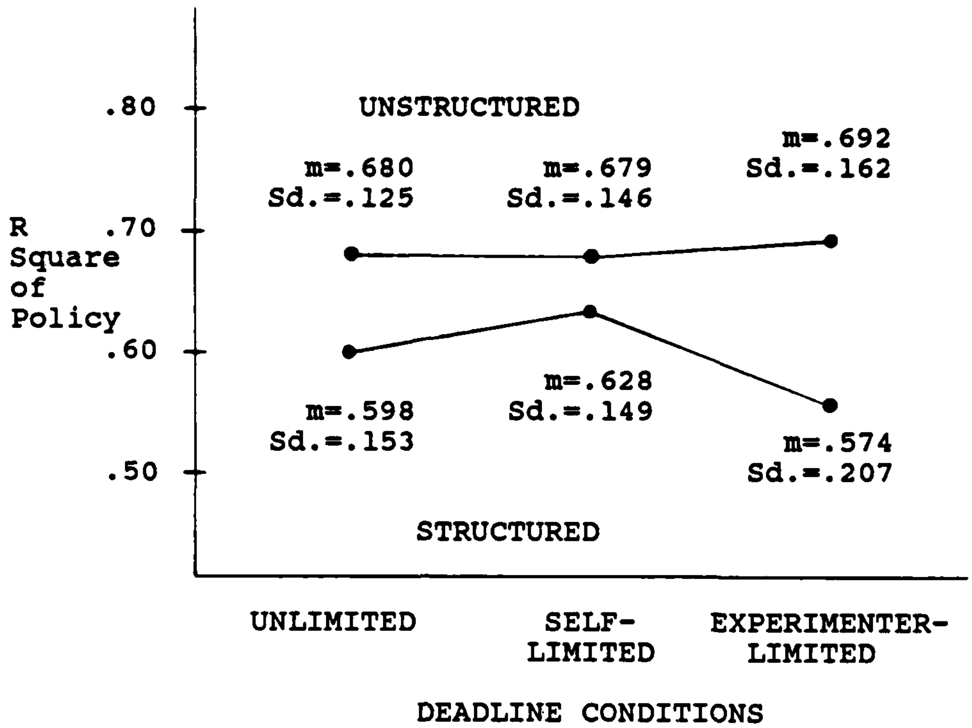


Figure 2. R Square of Policies for Structure and Deadline Conditions

within an ordered fashion. The mean relative weights for these conditions were: unstructured= .66, Sd. =.27; structured= .51, Sd. = .31. Conversely, cue #4 was found to possess a lower relative weight, F (1,152)= 8.83, p=.004, when it was presented in an unstructured format as opposed to a structured manner. The means and standard deviations for this cue were as follows: structured= .12, Sd. = .17; unstructured= .04, Sd. =.05.

Decision-maker insight was also shown to change as a function of whether the cues were structured or not. The correlation coefficients, as transformed by Fisher's Z statistic, were found to vary dependent upon cue structure, Z= 4.02, p=.000. Higher insight tended to be associated with unstructured cues (r=.54) when compared with structured cues (r=.36).

To summarize, adding structure to the decision problem resulted in a more inconsistent use of the presented information. Both the reported subjective weights and the empirical relative weights were influenced by the structure variable, but different cues were influenced. As a result policy maker insight was found to be lower for the structured condition.

Information Inconsistency

Each of the decision problems presented within the three deadline conditions was categorized into a consistent- inconsistent information continuum. This

continuum ordered the problems from those which contained very consistent information cues (all desireable or all undesireable) to those containing very discrepant information cues (half of the cues were desireable, the other half undesireable). A mixed effects model ANOVA was performed for the consistency variable on the decision times for all subjects and all trials. The mean decision times for cue consistency and deadline condition are portrayed in Figure 3. The results indicated that problems which contained more inconsistent information tended to be associated with longer mean decision times, $F(4,4987) = 8.24$, $p=.0001$, but only within the unlimited time condition. Within the two time-constrained conditions there were no significant differences attributable to this variable.

Type A Scores and Decision Making

Decision Times

Utilizing a mixed effects model ANOVA, the Type A / B classification variable was found to be significantly related to average response times within all deadline conditions. The means, standard deviations and effect sizes for this relationship are presented in Table 8. As can be seen within this Table, Type A persons responded significantly faster than Type B persons, especially when deadlines were introduced into the task.

Again employing a mixed effects model ANOVA, there

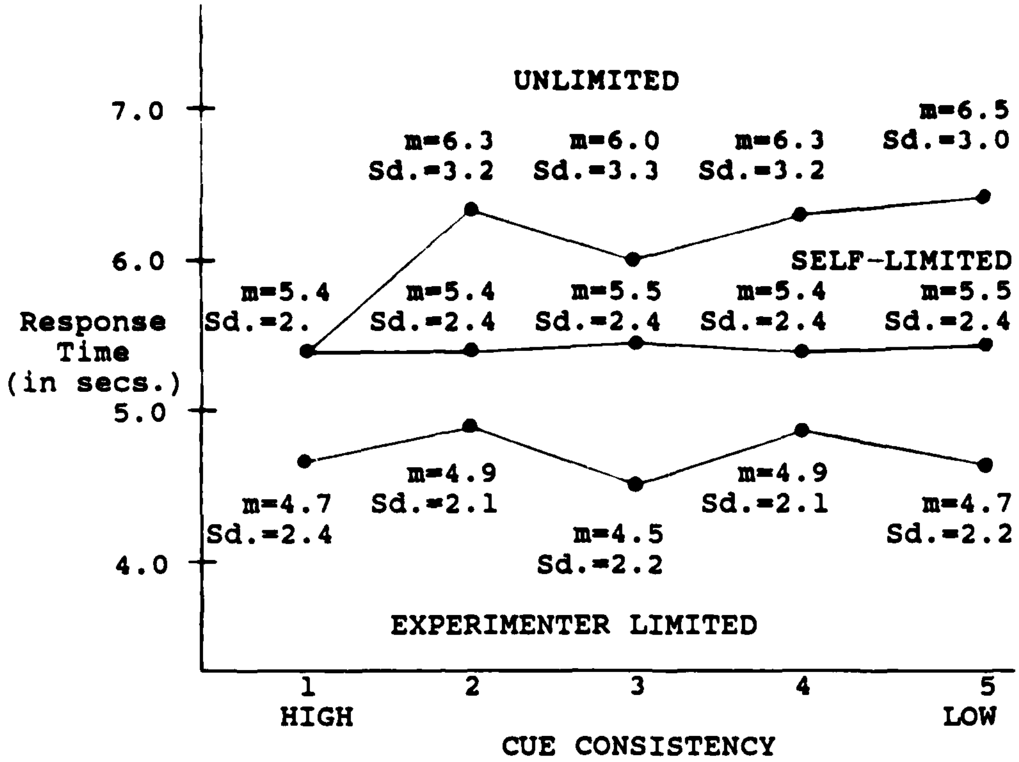


Figure 3. Decision Times for Cue Consistency and Deadline Conditions

Table 8. Mean Decision Times for Type A and B Groups in All Deadline Conditions

	DEADLINE CONDITION		
	UNLIMITED	SELF-LIMITED	EXPERIMENTER-LIMITED
TYPE B (n=40)			
MEAN	6.476	5.950	5.343
Sd.	3.251	2.478	2.224
TYPE A (n=38)			
MEAN	5.837	4.983	4.335
Sd.	3.241	2.315	2.096
For A/B contrast:			
$F(1,4990) =$	48.37	201.94	270.59
$p =$	.0001	.0001	.0001

was a significant difference, F (1,4990)= 5.91, p=.015, discovered in the average probability rating for selecting the organization within the unlimited time condition due to the Type A variable. In this condition Type B persons' answers were, on the average, more favorable towards selection (mean= 3.70, Sd. = 1.79) than were Type A's (mean= 3.61, Sd. = 1.74). However, this difference did not hold up for the two deadline treatments.

Because the lengths of the self- and experimenter-determined deadlines were variable (they were based on individuals' practice times) they also were examined for possible Type A/B differences. There were no significant differences in the ANOVAs performed on the length of the self-selected or experimenter-determined time limits for the Type A variable, although differences in the experimenter-determined time limits approached statistical significance, F (1,76)= 2.81, p=.094.

<u>Subjective Ratings</u>

Within the subjective ratings, no significant differences due to the Type A/B variable were found in either the risk or the confidence estimates. A significant difference, t (37)= -2.21, p= .031, was found in reported pressure for the Type A group between the self-selected deadline condition and the unlimited time condition. The descriptive statistics for these differences are contained within Figure 4. Type A persons

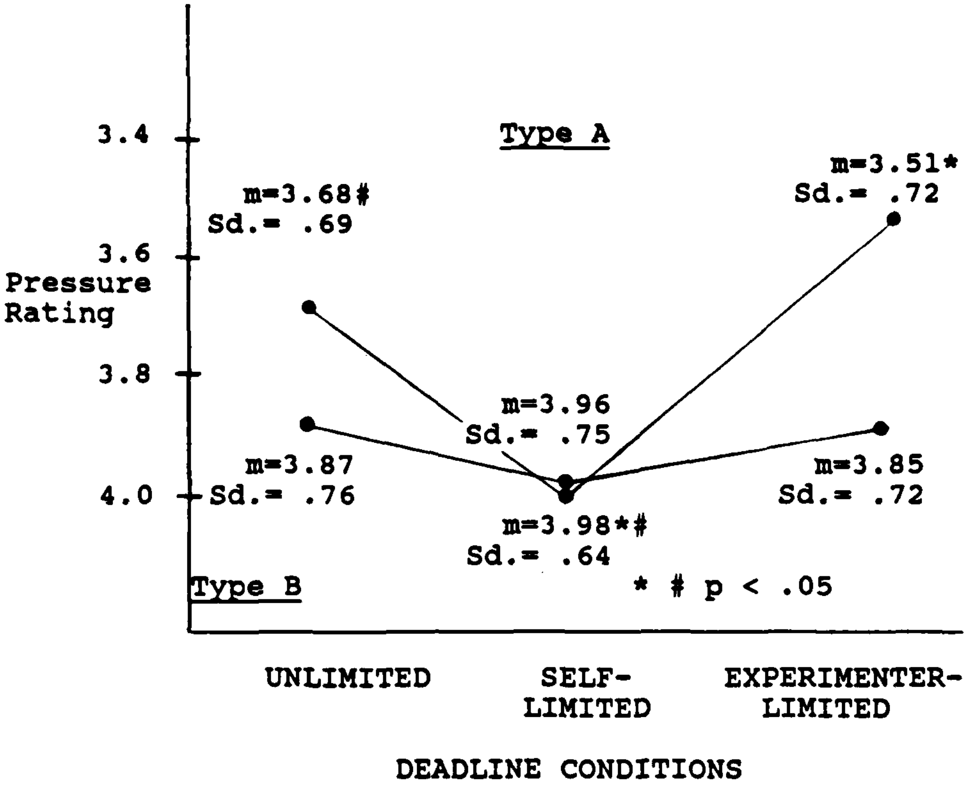


Figure 4. Pressure Ratings as a Function of Type A/ B and Deadline Condition

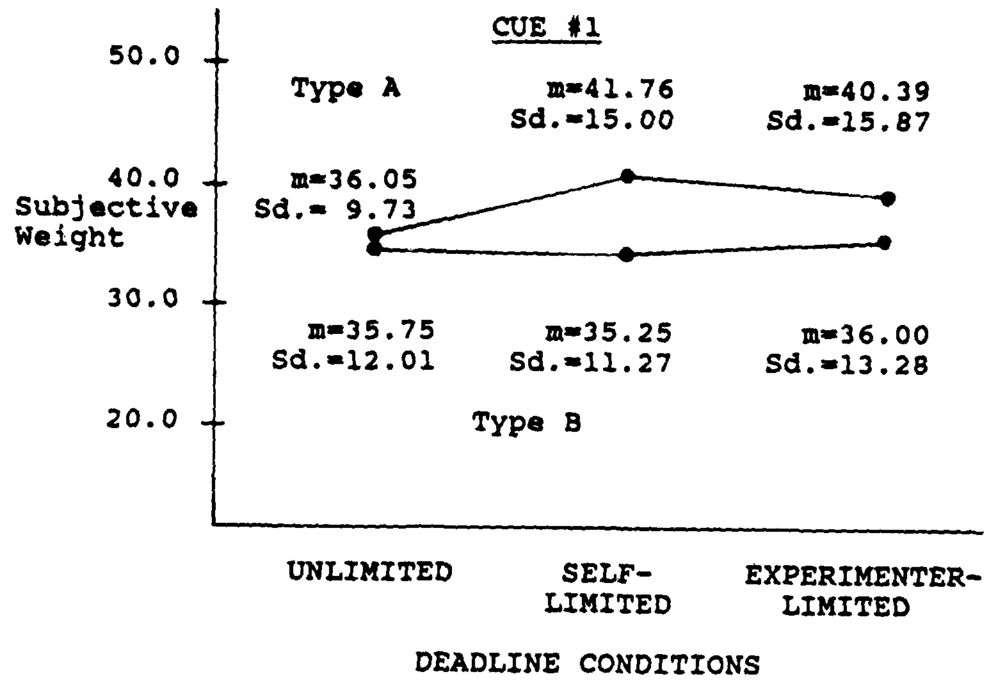
also reported, on average, significantly lower pressure, $t(37) = 4.04$, $p = .0005$, when faced with self-selected deadlines than when they were subjected to the experimenter determined time limits.

Policy Changes

Several significant differences were found in mixed effects ANOVAs on the subjective weights dependent upon the Type A/B variable. The means and standard deviations for these differences are displayed in Figure 5. The subjective weights for cues #1 and #3 were found to be significantly different for Type A and B persons, but only within the two deadline conditions. For this interaction effect cue #1, salary, was found to have a significantly higher, $F(2,152) = 6.14$, $p = .003$, subjective weight for Type A's than for Type B's. At the same time, cue #3, responsibility, was found to have a significantly lower, $F(2,152) = 6.42$, $p = .002$, subjective weight for Type A persons than for Type B's when within deadline conditions.

While trends in the relative weights of two cues (salary and security) approached statistical significance, $F(2,152) = 2.46$, $p = .086$; and $F(2,152) = 2.67$, $p = .070$ respectively, no overall differences were detected in the relative weights between Type A and Type B persons.

No statistically reliable differences were detected in the number of Beta weights associated with the policies



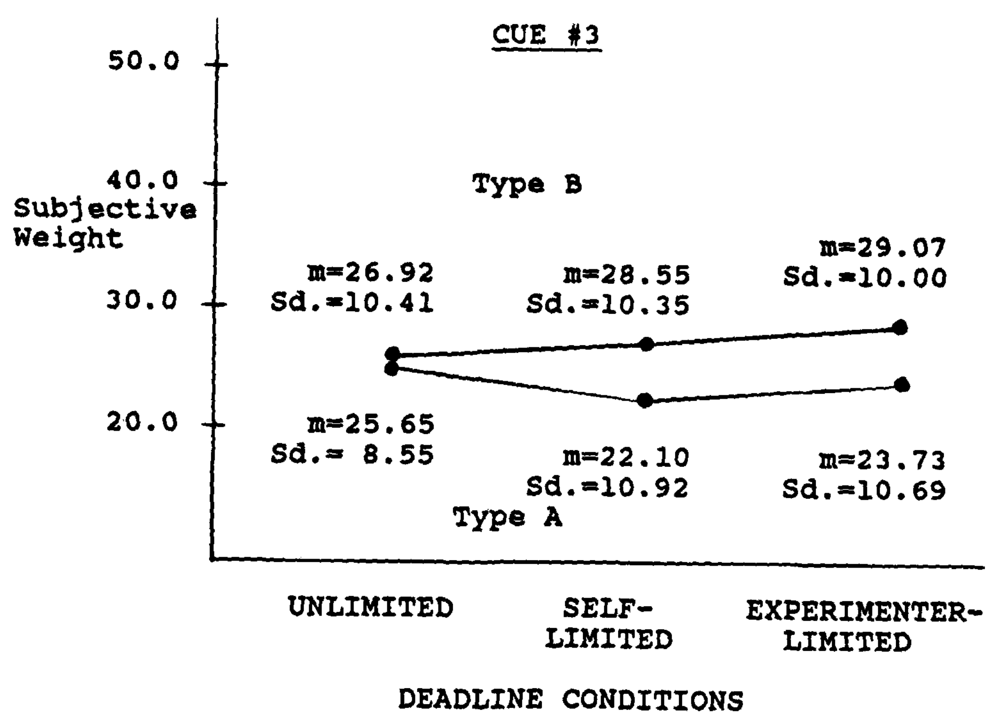


Figure 5. Cue Subjective Weights as a Function of Type A/ B and Deadline Conditions

of Type A versus Type B persons. This was consistent across all deadline conditions.

The R squared values for the policies of Type A and Type B people were found to be marginally different, F (1,76)= 3.37, p=.066, across all time limit conditions. The average R squared value for Type B persons tended to be higher (Mean= .67, Sd.= .15) than for Type A's (mean= .61, Sd.= .16). Additionally, a significant difference, t (37)= 2.48, p= .016, appeared in the R squared values within Type A policies between the self-selected and the experimenter-determined deadline conditions. The R squared values were higher for Type A people when under self-limited conditions (mean= .63, Sd..= .16) than when under experimenter-determined limits (mean= .58, Sd..= .19).

Significant differences due to the Type A variable were also detected in the insight index for both of the time pressured conditions. Type A individuals showed significantly higher, Z= 2.15, p=.016, insight than Type B's in the self-selected deadline condition. This difference was repeated within the experimenter determined deadline condition, Z= 2.02, p= .021. The mean correlations for the Type A group in these conditions were: $\underline{r}$ for self-limited = .58; $\underline{r}$ for experimenter limited = .57. For the Type B group the correlations were: $\underline{r}$ self-limited = .40; $\underline{r}$ for experimenter limited = .39.

To summarize the results for this variable, Type A individuals tended to make faster decisions than Type B's. They did not, however, choose faster deadline targets at which to aim. Type A's also reported lower pressure when they were exposed to the self-selected deadline condition than when they were faced with experimenter-imposed deadlines. Type A individuals were found to use the same relative amount of information as Type B's when constructing their policies, but were found to be somewhat more inconsistent in their application of that information. Finally, Type A's showed better insight than Type B's regarding their actual use of information when time constrained.

Cognitive Complexity and Decision Making

Decision Times

Generally, fewer significant findings were associated with this variable than for the Type A/B classification variable. No significant differences were found between more- or less-complex individuals in their mean decision times within either the unlimited or self-selected deadline conditions. However, in the mixed effects model ANOVA a significant difference, $F\ (1,4990) = 14.43$, $p = .0001$, appeared for the experimenter determined deadline condition. Cognitively more-complex persons appeared to respond faster on average (mean= 4.73 seconds, Sd..= 2.05) than less-complex individuals (mean= 4.96 seconds, Sd..=

2.35).

No significant differences were found for the complexity variable in the mean decisions made within any of the time treatments. No differences for this variable were detected in the average time length of either the self- or experimenter-determined deadlines. Also, no differences due to the complexity variable were discerned in the subjective reports for risk, confidence or pressure under any of the experimental conditions.

Policy Changes

No differences due to the complexity variable were found in the subjective weights of the policies. Similarly, no significant differences were found in the number of Beta weights or in the R squared values associated with the policies.

Significant differences due to the complexity variable were found in the relative weights, however. The means and standard deviations for these differences are shown in Table 9. Cognitively less-complex persons showed a significant change across time treatments in the relative weight for one of four cues: cue #1, salary. On the other hand, more-complex subjects were found to show changes in the relative weights of three of the four cues: cue #1, #2, and #3.

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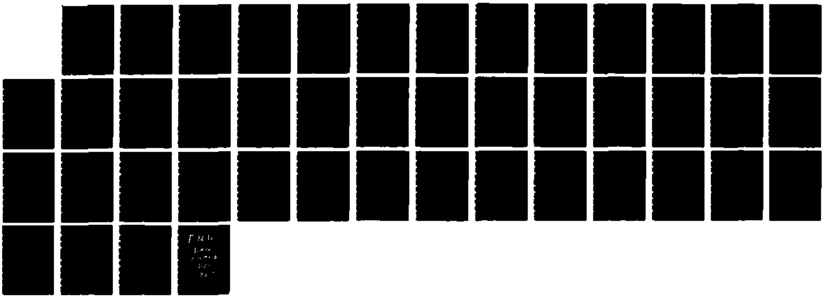

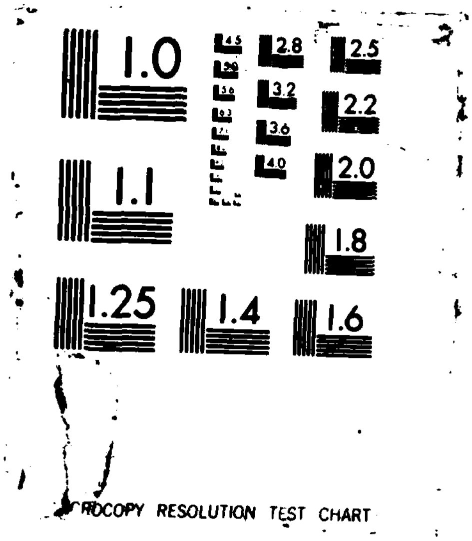
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ROCOPY RESOLUTION TEST CHART

Table 9. Cue Relative Weights for Cognitive Complexity and Deadline Variables

	DEADLINE CONDITION		
	UNLIMITED	SELF-LIMITED	EXPERIMENTER-LIMITED
Cue #1			
more-complex			
Mean	.491*+	.592*	.585+
Sd.	.267	.314	.303
less-complex			
Mean	.572*	.613	.630*
Sd.	.327	.311	.317
Cue #2			
more-complex			
Mean	.310*	.236*+	.275+
Sd.	.227	.237	.254
less-complex			
Mean	.253	.238	.239
Sd.	.266	.276	.275
Cue #3			
more-complex			
Mean	.099*	.076*	.054
Sd.	.162	.116	.067
less-complex			
Mean	.104	.092	.082
Sd.	.184	.185	.162
Cue #4			
more-complex			
Mean	.097	.093	.083
Sd.	.117	.146	.164
less-complex			
Mean	.068	.054	.062
Sd.	.072	.102	.121

Sd.= Standard deviation
* + significantly different (at $p < .05$) from other row entries with same symbol

Interaction Effects

No significant interactions between the complexity variable and the structure variable were found in any of the dependent measures investigated.

A significant interrelationship with the Type A variable was found, however. While there were no significant differences in the number of Beta weights for cognitively more-complex and less-complex persons within the Type B sample, there did appear to be a marginal difference between more and less-complex individuals within the Type A group. This difference was evidenced within the unlimited time condition, $t(36) = -1.95$, $p = .055$, and within the self-limited deadline condition, $t(36) = -1.97$, $p = .053$. These differences are portrayed in Figure 6.

Summary of Results

Because of the variety of experimental manipulations and dependent variables used within this study, a point by point summary review of the results as they apply to the enumerated hypotheses generated within the introduction is believed useful.

Hypothesis Number 1: Not supported; Policymaker insight did not decrease as a function of time limits.

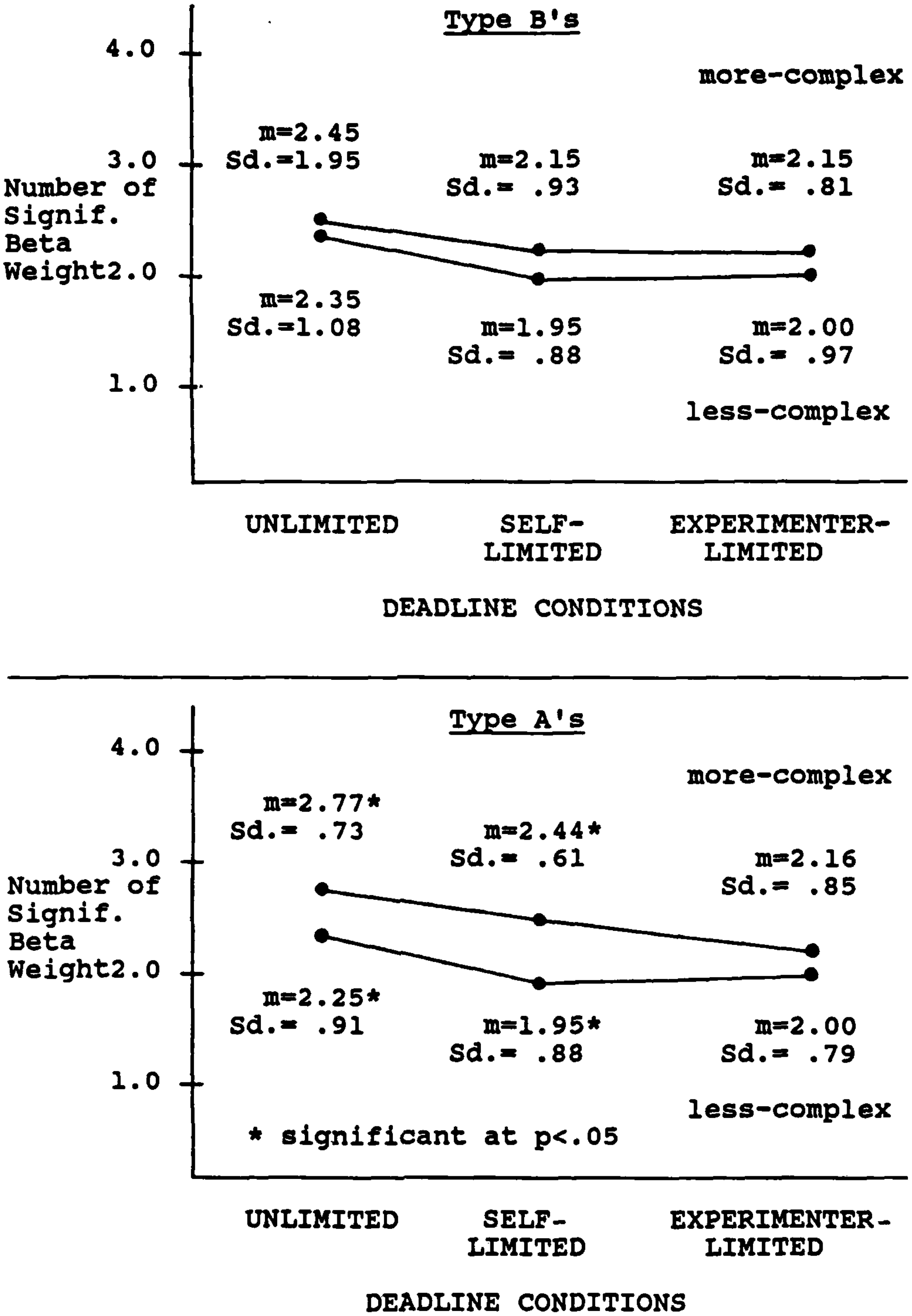

Figure 6. Number of Significant Beta Weights for the Type A/B and Cognitive Complexity Variables for All Deadline Conditions

Hypothesis Number 2: Supported: The perceived pressure was less when decision makers were allowed to help establish the task deadlines.

Hypothesis Number 3: Not supported for decision times, but supported for R square values Adding structure to the decision problem showed a differential impact on the R square values dependent on the kind of imposed time limit.

Hypothesis Number 4: Not supported: The configural use of information (interaction of cues) was detected in all time conditions. However, its overall impact was low.

Hypothesis Number 5: Not supported: Perceived risk did not increase as a function of increasing time constraints.

Hypothesis Number 6:

A. Not supported: No difference between decision times was found because of the addition of structure to the decision problem.

B. Supported; however, only within the unlimited deadline condition. Inconsistent cues were associated with slower decisions than when the cues possessed more agreement.

C. Supported; Type B individuals took longer to make decisions than Type A individuals across all conditions.

D. Not supported: Conceptually more-complex individuals were not slower than less-

complex persons. In fact, they were faster in some circumstances.

Hypothesis Number 7:

A. Not supported: There was no policy performance difference between Type A and Type B persons under self-selected or experimenter-imposed deadlines.

B. Not supported: Type A persons tended to show greater, not less, insight than Type B persons especially under deadline conditions.

C. Not supported: Type A's were able to report changing subjective weights and their weights were different from Type B persons.

Hypothesis Number 8:

A. Not supported: Cognitive complexity was not related to observed information usage.

B. Not supported: The rate of decline in information usage due to the introduction of deadlines was not different between the more- and less-cognitively complex.

C. Not supported: No interaction between cue structure and cognitive complexity was found in the policy parameters.

Hypothesis Number 9:

A. Not supported: The lengths of the self-selected deadlines were not different for Type A and Type B individuals.

B. Not supported: The lengths of the self-selected deadlines were not related to the cognitive complexity variable.

Chapter 5

DISCUSSION

The main purpose of this study was to empirically document the impact of restricted decision times upon both the subjective and the empirically-derived policies of decision makers. Also pertaining to deadlines, it was desired to investigate whether affording subjects some degree of control over the establishment of deadlines modified their subsequent impact. A second objective of the study was designed to examine the relative effects of varying the cue structure and cue consistency of the judgement task within deadline conditions in an attempt to document the potential interaction of these influences. Third, the study attempted to assess the contribution of selected individual differences variables, Type A coronary prone behavior and cognitive complexity, to the explanation of time-limited policy-capturing judgements. This multifactorial approach was undertaken to see if the relative effects and interactions of these variables could be "captured" and documented via regression models. Finally, it was hoped that the study could document the predictability of policy equations constructed under one set of task conditions and point to potentially useful parameters for estimating performance under other task conditions.

It is important to restate the caution that while the regression approach to the capturing of policies is capable of documenting a model of predictor cue utilization (like other actuarial models), it provides only weak support for explicating the psychological processes which actually take place. As a consequence, these policy models are able to represent only one possible description of the information processing which takes place and the interpretation of the results of this study are constrained by that fact.

Deadlines

A number of basic hypotheses were generated at the outset dealing with the impact that self-selected and experimenter-imposed deadlines are believed to have upon the decision-making behavior of the subjects. First, it was hypothesized that placing decision makers under restricted time conditions would cause a decrease in the number of cues used in formulating judgement policies. Evidence for this effect was found in the present study in support of previous research findings (Rothstein 1986, Wright 1974). As was found in the earlier studies, the number of cues possessing significant Beta weights decreased as a function of time restrictions. The number of significant Beta's found in this study was in the two to three cue range. Other studies have reported two to three items for unrestricted decision making, with one to two items for time pressured judgements (Wright 1974).

Previous research showed this effect between groups. The present study extends this result by showing this decrease within individuals exposed to both unrestricted and restricted time periods.

It was hypothesized in this study that introducing time constraints would not result in increased random perturbations in judgement behavior, but rather would manifest itself in terms of consistent biases. This effect was shown in the present study through the maintainance of a stable R squared value across deadline conditions. Had an increase in random error occurred, this would have been documented as a decrease in the R squared value, an index referred to as an indicator of "cognitive control" in the consistent utilization of information (Hammond and Summers 1972). The observed reduction in the strength of individual cues used to construct the policy within deadline conditions could also have resulted in significant decreases in the R squared values simply by virtue of contributing smaller variance to the regression equations. That this reduction in explainable policy variance did not occur, further attests to the non-random nature of the deadline effects.

It was specifically hypothesized that decision makers' self-insight would decrease as a function of deadline pressure. This hypothesis was grounded in the expectation that the information processing required of speeded decision making would tend to be more automatic

and thus less available to the introspective analysis captured by the subjective weighting process. This hypothesis was not supported as policy maker insight did not decrease with deadlines (in fact, the trend was for this index to slightly increase). This marginal increase in insight appears to be due to the fact that while subjects did indeed focus on fewer cues when under time pressure, they were also able to report their focusing of attention, consequently improving the correspondence between their empirically-derived and subjectively-stated usage of cues.

The counter-intuitive nature of this result may be related to another surprising finding regarding decision maker insight reported in an earlier study (Slovic, Fleissner and Bauman 1972). In that study it was reported that stockbroker policy insight decreased as a function of experience. The explanation offered at that time was that experienced brokers tend to rely on more automatic decision-making skills than younger brokers who must rely on newly acquired skills which demand focal attention. In the present study, the time-pressured shift towards more automatic modes of responding did not interfere with the reporting of those changes in processing. Therefore, another explanation seems necessary at least for the present case. A more parsimonious explanation may be that decision makers who use simplified policies (time-pressured or perhaps, inexperienced judges) are

better able to report them (and thus show better insight), not because of the influence of automaticity but rather, because of their simplicity.

Another supporting indication that time-constrained decision makers employed simplified policies was the finding that the extent of information cue interactions (configurality) tended to decrease with increasing time pressure. In this study it was hypothesized that configurality would not be observed due to the independence of the cues and the severity of the time limitations. However, one consistent interaction effect was noted (job salary by job security) in all time conditions and thus, the hypothesis was disconfirmed. It should also be noted though, that the overall importance of the interaction term was relatively small (omega square was always less than .01) throughout the study. This rather small explanatory contribution from cue interactions seems to be consistent with the results of previous research (Slovic 1969, Wright and Weitz 1977).

It was found that self-selected time constraints (as constructed within this experiment) were not substantially different from experimenter-determined deadlines in terms of their impact upon the policy performance of all subjects. Therefore the hypothesis which held that subjects would demonstrate improved information usage under self-selected deadlines was rejected. Yet, this experimental manipulation appeared to be qualitatively

different in its impact upon other measures collected within the study. The mean response time for the self-selected deadline condition was significantly longer than for the experimenter selected condition even though the decision "window" provided the opportunity for even faster responding. Qualitatively, subjects regarded self-selected deadlines more positively than they did externally imposed time constraints. Their mean reported pressure was lower and their decision confidence was higher when they were confronted with self-selected conditions and these results support the proposition that self-determined time limits represent an experientially distinct form of time pressure. It also suggests an effective way to lessen the phenomenological "hurry" associated with deadlines: that is to allow subjects to select deadlines within constraints.

When looking at the confidence and pressure ratings, it is interesting to note that there were no differences between the unlimited time condition and the experimenter directed deadline condition. As mentioned within the introduction, one of the explanations put forward to explain the characteristic overconfidence that judges demonstrate is the "illusion of control" (Slovic, Fischer and Lichtenstein 1977). Assuming that a major characteristic distinquishing the self-selected deadline from both the uncontrolled and the experimenter-controlled conditions in this study was the operant act of exerting

control over the deadline (by selecting the target time at which to aim), the "illusion of control" hypothesis seems may be a potential explanation for the heightened confidence accompanying the self-selected deadline experimental manipulation. An alternative explanation for this effect may be that subjects developed a heightened commitment to the deadlines as a function of being allowed some choice in their construction. As a result their motivation to accept and positively react to the deadline may have increased. Arguing against this explanation, however, is the finding that the introduction of deadlines and other external task constraints have been shown to actually decrease intrinsic motivation to perform a task in some populations (Amabile et al. 1976, Reader and Dollinger 1982).

Cue Structure and Consistency

It was hypothesized that structuring the information cues in an order from most to least important (based on previous research results) would cause changes in the decision-making behaviors of both unconstrained and time-constrained decision makers. The results suggested that providing structure to the cues helped to facilitate quicker overall decision times. Similarly, the consistency or general agreement of the information cues was also shown to impact overall decision times, with more inconsistent cues being associated with slower decision times. This effect, however, was only demonstrated for

the no-deadline condition. It would seem that the deadline manipulation overshadowed the effect of cue consistency on decision times. Focusing on fewer cues within time-constrained conditions served to mitigate inconsistencies in the cue set.

These reductions in overall processing time as a function of cue structure and consistency seems to support the straightforward notion that providing nonconflicting cues in a predictable and understandable format allows for the faster acquisition of cues deemed necessary for a decision. It is somewhat surprising then, that the average R squared value for structured policies were significantly lower than for the unstructured conditions. Assuming that providing structure allows faster search for information, one would expect that at least the same amount of time would be available for integrating the information, resulting in an unchanged consistency or R squared value. However, as was demonstrated in this research, just the opposite was found: R squared values tended to decrease as a direct function of providing structure. Further, it was shown that the impact of structure was not consistent across deadline conditions but rather tended to vary as a function of deadline manipulation.

At least two alternative explanations are available to describe the observed effect of structure on the policies. First, one may argue that presenting the cues

within a structured format merely increases the overall speed of responding and that more errors (manifested as a decline in the R squared value) occur as a result. However, as was demonstrated with the deadline effects, faster responding by itself does not necessarily cause decreases in the R squared values of the policies.

Another possible explanation for this counterintuitive result may be that providing structure to the cue set not only permits more timely acquisition of information, but also gives rise to unsuccessful attempts at constructing more complex (and less linear) policies. The integration attempts are shown to be generally unsuccessful because the number of significant Beta weights (an indicator of policy complexity) was not shown to increase as a function of structure. Thus, policies do not become more information based. This latter explanation, however, conflicts with the results of an earlier study (Russo et al. 1977) where greater use of information was found to accompany the effects of structure for time-constrained decision makers. In that study time-limited shoppers made greater use of unit price information when products were systematically arranged on shelves compared to when they were not.

The results of the present study suggest that decision makers may have attempted to use more information with the additional time afforded by having the cues structured, but could not successfully integrate it,

because the time was not adequate for this integration task. Consequently their "cognitive control" was adversely impacted while being presented the "facilitating" effect of structure. For this explanation to be supported by the data, one would expect to find greater differences in R squares as the time available for integration became more restricted. This appears to have happened if one contrasts the experimenter-limited condition with the unlimited time condition.

This detrimental effect may be related to the adverse impact of MAU training cited earlier (Zakay and Wooler 1984). In that study subjects' attempts to improve the use of information resulted in less consistent application of new policies. Others have shown that attempting to modify policies can initially result in poorer performance (Hammond and Brehmer 1973).

Insight was also found to decline with the introduction of structure to the cue set in this study. While subjects reported the subjective weights for cues #1 and #2 (salary and security) to change with the introduction of structure, the observed relative weights actually changed for cues #1, and #4 (salary and advancement). With structure, cue #1 became less important and cue #4 became more important to the empirically-derived policy. Considering that the cues impacted by structure were the first and last in the sequence provided to the subjects, this is suggestive of a

serial position effect (recency) taking place within the relative weights but not the subjective weights. Additionally, the greater similarity of the relative weight values among the cue set appears to be another indication that subjects were attempting to integrate more cues when the cues were structured. One indicator which has been used in the past to document greater use of information is the standard deviation of the relative weight set. Smaller standard deviations i.e. greater similarity in relative weights are suggested to be indicative of using more cues. Because this change occurs within the relative weights alone, it suggests a change taking place outside of the decision makers' awareness. The greater incongruence between relative and subjective weights for structured cue sets resulted in a consistently lower observed insight measure.

The appearance of this poorer insight provides a potentially unforeseen drawback to the use of structure within cue sets for forestalling the information utilization disadvantages of restricted decision times. By attempting to provide the means by which more information may be integrated into actual policies, the use of a most-to-least important cue structure may not only directly introduce artifactual influences into the results of the decision task (such as a recency effect), but it may also indirectly cause an unanticipated decline in the policymaker's self-insight. Structuring cues for

the time-constrained decision maker in the same manner as it was in this study, might actually result in complicating the decision task by providing marginally useful increases in time with which to poorly integrate additional pieces of information.

It is also true, however, that the particular structure employed in this study would cause the least important to be influenced by the recency effect. Had another structure been employed, where for example the second most important cue was last, perhaps a facilitating effect may have occured. This is a possibility which can be substantiated empirically.

Individual Differences Variables

Type A/B profiles

Analyzing the average decision times for Type A and Type B persons confirmed the hypothesis that Type A's would be characteristically faster in their decision making. Surprisingly, it was also found that the mean answers given by Type A's, across all experimental manipulations, were significantly lower in their rated probability for selecting a hypothetical organization than for their Type B counterparts. This result may be tied to the general negative bias for time-constrained decision makers which has been discussed earlier in this paper. Assuming that Type A's are chronically time urgent, then their lower average suggests that they also appeared to

emphasize the negative aspects of information profiles in this study. This result by itself does not make clear whether they focused on specific negative cues or tended to generally negatively bias all aspects of the cue set.

No differences were found between the Type A and Type B persons on the length of time selected for the self-constrained decision deadline, contrary to what was hypothesized. The trend in the data was for slightly shorter times for Type A's, but the trend never reached statistical significance. Apparently, the believed preference for control was not a primary factor in the selection of the self-deadline.

While control was not implicated as a contributory factor in the formulation of deadline times, Type A individuals did report significantly more positive evaluations for confidence and pressure with self-selected deadlines than for the experimenter-determined conditions. This finding provides additional confirmation of the greater desirability of believed internal control for Type A's even when their behavior is obviously constrained by other environmental factors, like decision deadlines.

Differences in policy parameters between Type A's and Type B's were less distinctive. No observable differences were detected in the number of significant Beta weights (the trend was for Type B's to possess fewer), but Type

B's policies possessed marginally higher average R squared values. This finding suggests that the situationally time-constrained Type B individual is qualitatively different from the more chronically time-urgent Type A. Type B's, while characteristically slower decision makers, use as much information as Type A's and are more linearly consistent in their use of that information.

Cue relative weights also did not show any strong differences due to the Type A/B variable. Cues appeared to be used similarly by Type A and Type B individuals regardless of external conditions. However, Type A's were better able to report (using subjective weights) changes in perceived cue values when under deadline conditions. This was unexpected and contrary to what was hypothesized. It was expected that Type A's would not be as self-aware of cue utilization changes brought on by deadlines as Type B's. It has been suggested that, as a group, Type A's tend to show lower self-insight (Rosenman and Chesney 1982). In the present study, Type A's more accurately reported focusing on fewer cues and consequently achieved higher insight than their Type B counterparts.

Cognitive Complexity

As was reported earlier, the scores for this variable were not correlated with the scores on the Type A/ B scores. Despite this advantageous independence, many of

the individual differences hypotheses generated for this variable were either not supported or were contra-indicated in the data. Generally, this variable did not account for a significant proportion of the variance in any of the measures collected within this study. For instance, cognitive complexity was not found to be associated with the length of the self-selected time limits, nor with perceived confidence in judgements as it was hypothesized to be. In the present study, the presumed greater policy complexity for more-complex individuals was detected but was not strong enough to reach significance. No interaction between the effects of the structure variable and cognitive complexity was found. This particular result is in direct contradiction to the results of Bieri et al. (1966) who found cognitively more-complex individuals to be less sensitive to primacy and recency effects in information structure.

A difference did emerge between complexity groups, however, when looking only at the two deadline conditions. In this instance, it was found that the policies of more-complex individuals tended to have more significant Beta weights than the less-complex. At the same time within this contrast, the R squared values were not different, departing from the observed negative relationship between these two measures found throughout the rest of the experiment. This finding suggests that more-complex people achieved greater policy complexity

without sacrificing linear consistency under deadline conditions. This finding is in support of most research in the area and contradicts the conclusion of White (1977) who suggested that complex persons would tend to overload faster and yield greater decrements in performance than would less complex persons when faced with information load stressors.

Finally, significant differences between the more-complex and the less-complex were detected for the amount of time taken to reach decisions, but only within the experimenter-determined deadline condition. In this measure, as in the beta weight measure, this individual difference variable seemed to become more important as deadlines were introduced. The direction of this result contradicts previous research, because it suggests that cognitively complex individuals take less time to deliberate than do the less-complex. Because this result is inconsistent with previous findings and was not duplicated in the other deadline condition, it is difficult to assign a theoretical explanation for this finding.

Chapter 6

CONCLUSIONS and RECOMMENDATIONS

Methodological Implications

This study attempted to manipulate several selected task and context effects to observe their effects upon the policy construction of decision makers. It was found that the experimental manipulations of deadlines and cue structure contributed to the explainable variance of the data and therefore showed that such manipulations may indeed be "captured" within this paradigm. As a consequence, the author contends that the individual and interactive influences of these and other task and context variables need to be explored in future policy-capturing studies to more fully explicate how policy construction is impacted.

Within this study, specific evidence regarding the efficacy of capturing experimental manipulations was obtained from the R square values. The R squared values for this study were in the range of .63 to .65 for the various time pressure treatments (which correspond to multiple R values between .79 and .80). Zedeck (1977) reported a similar R square value when this task was first used: .67. It has also been reported (Anderson 1977, Ramanaiah and Goldberg 1977) that typical R squared values

for this kind of policy capturing study are in the range of .56 to .86. Slovic and Lichtenstein (1971) have commented that R squared values can be expected to be smaller in laboratory experiments where the information cues tend toward orthogonality as they were in this study. It remains to be seen whether similar values could be obtained were this same experiment to be conducted with more representative decision tasks.

For deadline as well as other experimental manipulations, this study has pointed to the need for future studies to collect multiple information usage measures to be able to accurately characterize how policies change. Measures should include both indicators of specific cue usage (such as the number of significant Beta weights and the cue relative weights) and more holistic measures about the performance of the policy (such as the linear consistency or R squared value). Future efforts should use both types of measures in combination to accurately reflect changes in policies over task conditions. To illustrate one potential problem, focusing only on changes in the linear consistency of policies without paying adequate attention to the contribution of individual cue items could easily result in the oversight of more qualitative policy changes, such as the formation of more or less complex policies.

This study has also provided empirical evidence that the subjective weighting technique developed by Hoffman

(1960) frequently used within this research paradigm, is indeed sensitive to changes introduced through task and context manipulations. Further, this weighting approach has been shown to be amenable for reflecting differences between individuals and sub-groups. The ability of subjective weights to reflect such changes provides supporting evidence for their utility and responds to an earlier call to examine this part of the policy-capturing methodology (Schmitt and Levine 1977). In part because of the sensitivity of the subjective weights, the insight measure has also been shown to be responsive to changing task conditions. This study has shown that changes in a policy maker's insight may indeed be captured in future experimentation and used for comparisons between and within subjects.

Finally, while it was not a primary purpose of the present study, the results from the alternative policy construction approaches suggest that policies employing cue scale values which are constructed by the subject, as opposed to the experimenter, are better predictors by virtue of accounting for more of the policy variance. This finding is in general agreement with earlier results (Cotton, Jacobs and Grogan 1983, Doherty and Keely 1972). It was interesting to note, however, that while this apparent predictive superiority was observed, it tended to decline with the introduction of time constraints upon the decision-making task.

Deadline and Cue Structure Implications

This study has provided additional empirical evidence in support of the belief that decision makers' policies become focused upon fewer cues as time limits increase. This has significant implications for the design of decision-making tasks where performance time is limited. It appears that two to three uncorrelated information items is the maximum which can be used by most people who must make speeded decisions. Consequently, those who design decision tasks should take into consideration this reduced cognitive ability when they are constructing such tasks. Information should be distilled and condensed to provide only those cues which are most relevant to successful task completion. Providing more information than the two or three cues will only complicate the task and overload the decision maker.

There was no support for the belief that the use of information in self-selected decisions would be greater than that for externally imposed deadline conditions. Decision performance was virtually identical in the two conditions; however, the subjective pressure was considerably reduced for the self-limited condition. This finding offers the possibility of an experimental methodology for obtaining speeded performance from individuals while at the same time significantly reducing the associated stress with that intervention.

The ability of judges to manipulate information configurally was shown to be generally limited and to decrease when time limits were introduced. This result when combined with the decline in the amount of information utilized provides supporting evidence of the trend towards more simple linear use of information when judges are time constrained. Consequently, the configural advantages that have been touted for clinical judgement over actuarial prediction (Meehl 1954) would appear to decline for situations demanding speeded decision responses. In other words, the superiority of actuarial judgement models for the integration of already defined information increases as time limits become significant for human decision makers. This is an important finding for those decision domains where the complexity of human judgement is very much relied upon. Such judgement complexity will invariably decline when extreme time limits are imposed upon response time.

The effects of cue structure are less clear cut. The ultimate effects of structure may be positive or negative depending upon the importance of the cue and its relative position within the cue set. As a negative outcome, attempting to enhance a time-constrained decision maker's ability to use information by providing information in a structured format may at the same time introduce unforeseen cue structure artifacts into the observed judgement policies. Decision makers are influenced by the

structure or serial position of the information cues they are presented. If those cues are not ordered with this in mind, unimportant cues may be overinfluential in determining the final decision. However, if one structures the cues with this effect in mind, the time-constrained decision maker may ultimately place more importance on the cues than he should.

TABP and Cognitive Complexity Implications

Consistent individual differences in judgement styles can be identified through the policy-capturing approach. These differences can be further understood through grouping the individuals based upon relevant behavioral and cognitive measurements. For time-constrained decision tasks, the Type A/B distinction appears relevant, while cognitive complexity does not. Type A's were shown to be more aware of the simplification shift in strategy necessitated by the presence of deadlines. This suggests at least one advantage to being a Type A decision maker. Unfortunately, this higher insight was not accompanied by better (more consistent) performance. This would argue against selecting Type A's for situations where speeded decisions are required.

Difficulty in establishing differences for the cognitive complexity variable may have been encountered with the imprecise method for identifying subgroup membership. Although the median split approach, similar

to that adopted in this experiment, is the most frequently employed method by researchers in this area (Johnston and Centers 1973, Richardson 1977, Tripoldi and Bieri 1966) perhaps a more selective approach, such as an extreme groups method, would better serve to highlight hypothesized differences.

The results pertaining to cognitive complexity might also be more definitive were the measurement of this variable not as problematic as it is at present. Several authors (Honess 1975, Kuusinen and Nystedt 1975, Miller 1969, Vannoy 1965) contend that little convergent validity has been shown thus far for the measurement of cognitive complexity. As a consequence other measures might give different results. The present study, while employing a novel experimental measurement tool for this construct, has not helped to clarify matters in this regard other than to show a task domain where measurement of the construct does not appear profitable. The development of additional measurement approaches to the estimation of this variable would do much to encourage future research.

Recommendations

Future research should focus not only on the policies of individuals but also on the policies of individuals aggregated according to meaningful psychological differences. One approach used successfully to aggregate individuals' policies is the cluster analytic technique,

where policies are clustered by the exhibited pattern of relative weights (Wiggins 1973). As an extension to the present study, it would be interesting to observe whether individuals identified as more or less complex, or more or less Type A, also tend to have their policies cluster into homogeneous groups based upon similar relative or even subjective weighting schemes. Further, a cluster analytic technique might show whether individuals tend to change cluster membership based upon the introduction of structure or deadline task influences.

Another extension to this study is suggested by the finding that the insight of policy makers does not decrease (and possibly increases) with the introduction of deadlines. This suggests that deadlines might be used to advantage in the training of decision-making insight. One of the most important limitations in human decision making is "cognitive conceit" or the lack of self-insight (Dawes, 1976). Training individuals to better recognize and understand their own information processing capabilities and limitations remains a difficult, yet important undertaking. While at present, there appear to be no long term "antidotes" for this problem (Gaeth and Shanteau 1983), perhaps, were decision makers given the opportunity to observe both the changes and the consistencies in their decision-making strategies when under varying time pressures (via real-time decision aiding mechanisms like the "cognograph", Hammond and Summers 1972), they might be

more understanding of their own individual decision making limitations. Showing decision makers how they consistently change towards simpler uses of information when they are subjected with deadlines may help them to understand not only the effects of the deadlines, but also how few cues they use even when not so pressured. It may be the case that the short term impact of current training interventions is due in part to the static "snap-shot" portrayal of an individual's decision policy. Showing an individual the dynamics of his personal decision making as conditions change might provide trainers of decision making more long lasting training impact.

The results of this study, like all other studies, are limited in their generalizability. The task used in this experiment was, of course, highly artificial owing to the experimenter's desire to use a factorial ANOVA as one approach to the analysis of information integration. The generalizability of the results of this experiment to other task domains is also constrained since only one task was accomplished. This task generalizability limitation is particularly germane to the cognitive complexity results where the subject's familiarity with specific task domains is believed to be highly influential in determining his display of complexity. Extending the results of this laboratory-based study to more familiar kinds of (real world) judgements, in which a greater number of interdependent cues occur, would do much to

support the generalizability of these findings. Other researchers have broadly investigated the effect of cue intercorrelations on policy equations and have shown that regression weights tend to remain stable while R square values tend to increase as the intercorrelations increase (Dudycha and Naylor 1966, Schenck and Naylor 1968).

Finally, because of the results of the study the author concurs with the call for future interactive decision maker-environment-decision task policy capturing research made earlier,

> Thus the question that should be addressed by those studying human judgement is not which model best describes the human-judgement process, nor is it which model best describes a given person's judgement processes, it is rather what task conditions elicit what kinds of strategies [policies] from what subjects. (Mertz & Doherty, 1974, p. 215).

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APPENDIX: DESCRIPTIVE DATA ON DEPENDENT MEASURES

Variable	Mean	Median	N	Minimum	Maximum
1. Reliability:					
Unlimited Time	.64	.69	78	-.29	.98
Self-limited	.70	.77	78	-.01	.99
Experimenter-Limited	.72	.76	78	.04	1.00
2. R Squares:					
Experimenter-Scaled:					
Unlimited Time	.61	.63	78	.04	.88
Self-limited	.64	.65	78	.04	.92
Experimenter-Limited	.63	.69	78	.14	.88
Self-scaled:					
Unlimited Time	.64	.64	78	.05	.88
Self-limited	.65	.66	78	.32	.92
Experimenter-Limited	.63	.68	78	.03	.92
3. Significant Betas:					
Self-scaled:					
Unlimited Time	2.44	2.00	78	.00	4.00
Self-limited	2.11	2.00	78	1.00	4.00
Experimenter-Limited	2.07	2.00	78	.00	4.00

APPENDIX (Continued)

Variable	Mean	Median	N	Minimum	Maximum
3. Significant Betas:					
Experimenter-Scaled:					
Unlimited Time	2.34	2.00	78	.00	4.00
Self-limited	2.07	2.00	78	.00	4.00
Experimenter-Limited	2.05	2.00	78	.00	4.00
4. Cognitive Complexity:	-100.72	-101.12	76	-284.25	194.75
5. Type A/B:	8.34	8.00	78	.00	18.00
6. Deadlines:					
Experimenter-Determined	5.59	5.00	78	2.00	13.00
Self-selected	6.51	6.00	78	3.00	12.00
7. Subjective Weights:					
Unlimited Time:					
Cue 1	35.89	35.00	78	10.00	65.00
Cue 2	20.89	20.00	78	5.00	40.00
Cue 3	26.30	25.00	78	10.00	50.00
Cue 4	16.89	13.00	78	5.00	40.00
Self-limited:					
Cue 1	38.42	40.00	78	10.00	95.00
Cue 2	19.50	20.00	78	1.00	40.00
Cue 3	25.41	25.00	78	2.00	55.00
Cue 4	16.67	15.00	78	.00	40.00

APPENDIX (Continued)

Variable	Mean	Median	N	Minimum	Maximum
Experimenter-Limited:					
Cue 1	38.14	40.00	78	10.00	95.00
Cue 2	19.12	20.00	78	2.00	35.00
Cue 3	26.47	30.00	78	.00	55.00
Cue 4	16.25	13.00	78	3.00	40.00
8. Confidence Rating:					
Unlimited Time	2.58	2.66	80	1.00	4.00
Self-limited	2.36	2.33	78	1.00	4.66
Experimenter-Limited	2.48	2.33	78	1.00	4.00
9. Pressure Rating:					
Unlimited Time	3.79	3.83	80	2.00	5.00
Self-limited	3.97	4.00	78	2.00	5.00
Experimenter-Limited	3.69	4.00	78	2.33	5.00
10. Risk Rating:					
Unlimited Time	2.45	2.33	80	1.00	4.00
Self-limited	2.38	2.00	78	1.00	4.33
Experimenter-Limited	2.52	2.33	78	1.00	4.33

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